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A Study of Land Settlement in Two Areas in the Extreme South-West of Western Australia.*

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INTRODUCTION.

In the decade following the last war the Western Australian Government entered into an ambitious scheme designed to bring people from the United Kingdom and settle them in previously undeveloped forest country in the extreme south-west of Western Australia.

Descriptions of the scheme and the progress which it made have been given elsewhere (1, 2, 3, 4, 5, 6) and need not be repeated here in detail. However, in order better to appreciate the problems of the localities described in this paper it will be necessary to mention certain aspects of the undertaking.

It did not develop to the extent originally planned. The original intention was to settle 6,000 holdings on which dairy farming for the production of butter-fat, and pig raising were to be the chief occupations. The maximum number of holdings settled at any one time was 2,442, comprising in all some 500,000 acres of country. Through linking together or abandonment the number of holdings was subsequently reduced to 1,700. In July, 1942, there were 1,144 occupants on what were once group settlement blocks, but by no means all of these people took up their holdings during the operation of the group scheme between the years 1921-30. The total number of settlers who went on to holdings only to leave them and return to England, or try their luck elsewhere is not known; 530 holdings were unoccupied and available for re-settlement in 1942.

Out of the 500,000 acres involved in the whole scheme about 145,000 acres of land have been brought into production, from which it is estimated that four million lb. of butter-fat are produced. Total butter-fat production for Western Australia is at present about 16 million lb. per annum compared with only two million lb. in 1921. Thus production from group settlement areas has been responsible for only four million of the 14 million lb. increase. On the other hand it is

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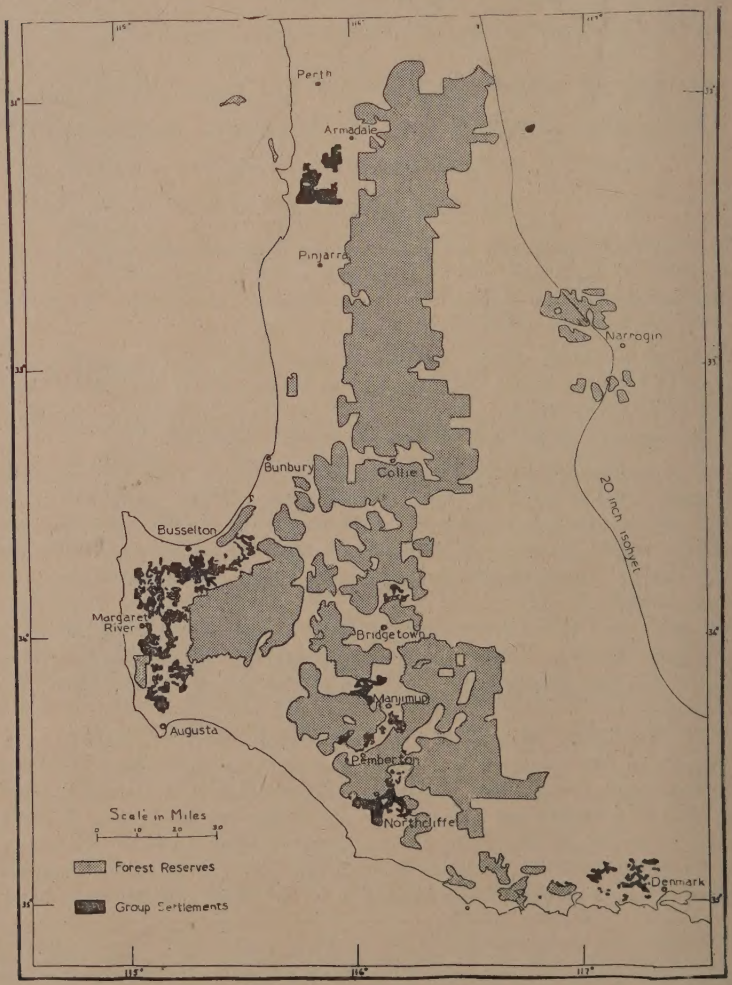
not unreasonable to assume that some of the lessons learned under the trial-and-error methods of the group settlement administration were applied with profit to the development and improvement of the dairying industry in other districts.

At the time of the inauguration of the Group Settlement Scheme butter-fat prices had risen to a high level. By 1934 they had fallen to about one-third of what they were in 1921.

Figure 1.—Location of forest reserves and areas originally opened for group settlement in Western Australia.



The downward movement in prices greatly accentuated the technical difficulties of settlement. The very unsatisfactory financial position of settlers was recognised by Royal Commissions in 1924 and 1925 and in the revaluations of 1928-29 and 1936. In 1927 further settlement was suspended. In 1930-31 the Group Settlement Department was eliminated and settlers came, and have since remained, under the direct financial guidance of the State-controlled Agricultural Bank.

Figure 2.—Yearly average factory prices of butter-fat in Western Australia, 1918-1941.

OBJECTS OF STUDY.

The present investigation was undertaken in the belief that a first hand study of the history, present position and future prospects of a small sample area of group settlement country should yield some facts that would be of value if land settlement schemes in the South-West were to receive serious consideration in the post-war years. In addition, it was hoped that it would provide some information about the usefulness of the survey method, a form of investigation not previously used in these districts.

Financial considerations restricted the scope of the project which had to be limited to what one worker could handle as part time work. Even then the study had to be further curtailed owing to the investigator being transferred to other duties. In the circumstances, therefore, it cannot be expected to provide answers to the many important questions which can be asked about the South-West land settlement. On the other hand, it does throw light on some of them so far as they concern two small groups of settlers.

LOCATION.

The field work was carried out in two localities some twenty miles apart, each of which was originally settled entirely under the Group Settlement Scheme. The selection of the areas was made in conjunction with a senior official of the Agricultural Bank, who had been intimately associated with group settlement

since its inception. These two areas were chosen because it was considered that they were in moderately successful districts and included within each group a range of blocks in which settlement had varied from success to complete failure. It was obvious that the selected areas should not be in localities which were among either the most or the least successful of the group settlement districts. The localities chosen are near the small townships of Busselton and Margaret River and, for the sake of convenience, have been designated A and B respectively.

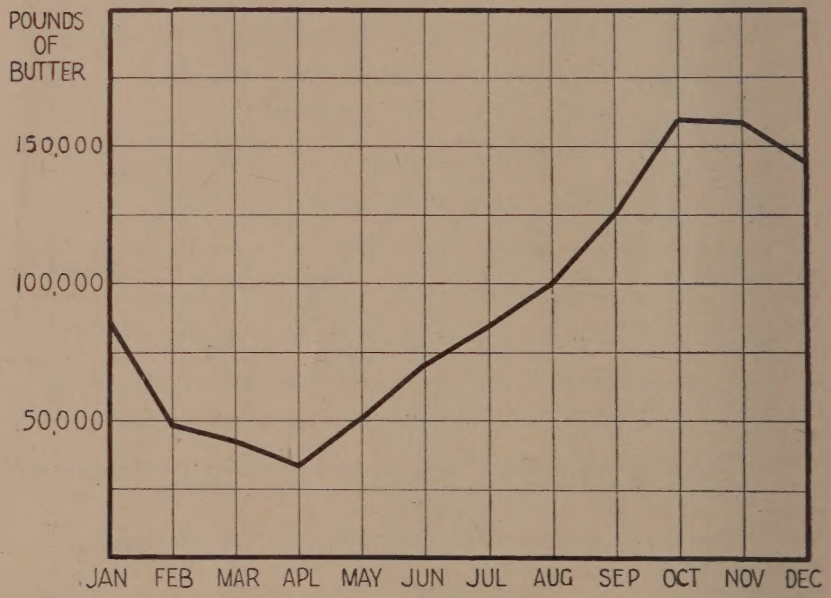


Figure 3.—Monthly output of butter in 1942 from the Margaret River butter factory.

METHOD.

Information was obtained from the settlers by personal interview. The investigator visited each holding and explained the purpose of the work. A list of questions for which answers would be required was also left. On the second visit more time was spent on each farm and the interviewer filled in the questionnaire from the information supplied by the farmer. The response was satisfactory. In settlement A, six out of the eight who were approached gave the desired information. In settlement B replies were obtained from seventeen of the nineteen persons interviewed.

CLIMATE.

The climate of the extreme South-West is Mediterranean, with a heavy rainfall, concentrated mainly in the months of April-October, and a warm dry summer period. The seasonal incidence of production is very marked. Plant growth is slow in the winter months, due to lack of sunshine, waterlogged soils and low temperatures. In the spring months there is a rapid acceleration of growth and most of the annual grasses and clovers, which constitute the bulk of the pastures, reach maturity in the early summer. As summer progresses and feed dries off

production falls away, reaching its lowest point in the late summer and autumn. The average monthly rainfalls for Busselton and Margaret River are shown in Table I.

TABLE 1.

AVERAGE MONTHLY RAINFALLS AT BUSSELTON AND MARGARET RIVER.

Centre.	Jan.	Feb.	Mar.	Apl.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total Inches.
Margaret River (33 years)	59	80	118	223	649	807	825	597	380	291	122	82	42·33
Busselton (61 years)	42	45	85	145	470	674	649	459	301	226	85	48	32·29

TOPOGRAPHY AND SOILS.

The topography of the two areas is somewhat dissimilar, although the vegetative associations, namely, sclerophyll forest consisting of jarrah (E. marginata), scattered marri (E. calophylla), banksia (Banksia spp), blackboy (Xanthorrhoea spp.) and grass tree (Kingia australis), are much alike.

In Area A the main soil type is a leached sand or light sandy loam overlying an ironstone clay at varying depths. It is interspersed with areas of clay pan, which, before clearing, carry low scrub of various types and which are usually under water in the winter months. The heavy rainfall and the flat nature of the country make waterlogging a difficult problem. On most of the properties good water is obtainable in the summer months from wells 18-20 feet deep.

Area B is in country dissected by a permanent stream and a number of small tributary streams, most of which are dry in summer. The topography of the country is juvenile in character, with the holdings located for the most part on the slopes leading down to the watercourses. The soils vary from lateritic ironstone on the higher levels to moisture retentive clays along some of the streams. Most of the soil types on the slopes are influenced by the debris from laterite occurring on higher levels. In the case of holdings with a river frontage permanant water is available. On other holdings ground water can usually be obtained at shallow depths in the gullies. In both cases the hilly nature of the country usually makes reticulation to the homestead and to other paddocks difficult.

In both areas annual top dressings of phosphates have been found essential for the establishment and maintenance of pastures. This need was not realised until after the inauguration of the Group Settlement Scheme. More recently there has been a realisation that on most holdings increased production follows the application of small dressings of copper sulphate, or other copper-containing fertiliser.

DEVELOPMENT.

Clearing operations commenced in area A in 1923. Two groups were established consisting of 42 blocks which ranged in size from 97 to 212 acres. At present twelve settlers hold 29 blocks. The remainder have reverted to the Lands Department. Six of the settlers who remain hold three blocks and five of them have two each. It should be remembered that when the groups were established it was expected that each block would be a "living area" for a settler and his family.

Official data concerning the number of temporary occupants of holdings are not available. However, one of the original settlers, who is still on his farm, estimated that about seventy settlers had passed through his group (20 blocks). Only four now remain.

The aim in the initial developmental operations was to clear 25 acres as quickly as possible so that the new settler could commence dairying and set his feet on the road to financial independence. The timber on the "twenty fives" in this area was pulled green, the branches cut off, butts sawn, trunks shot with gelignite. The logs were hauled into heaps and burnt. Although the jarrah and red gum (marri) of this area were not comparable in size to the timber in some other group areas, the forest was fairly dense. It is said that the cost of explosives alone was as high as £3 per acre on some of the blocks due to the faulty methods adopted.

After clearing it was not unusual for the land to be ploughed 9-10 inches deep, a treatment from which some of it has not recovered even yet. It was then seeded with a costly mixture of pasture plant seed of types which subsequent experience proved to be quite unsuitable for local conditions.

Figure 4.—Virgin bush in area B.

It was in the early twenties that the potentialities of subterranean clover in association with annual top dressings of water soluble phosphates were becoming known. Most of the later development carried out by the individual settlers has been along the lines of grubbing or chopping the small scrub, ringbarking the larger trees, and putting a fire through the paddock some months later. Subterranean clover is then sown in the autumn on the seed bed made by the ash and superphosphate applied at the rate of one to three cwts. to the acre. As a rule no cultivation is given. By the spring of the year a certain amount of feed is available. As the clover ripens it buries seed in the ground where it remains until germinated by the next year's winter rains.

Figure 5.—Similar country in the early stages of development. Note the dense stand of subterranean clover.

In this way a good stand of feed is obtained in the second year. The grazing of animals assists to keep the regrowth of scrub in check and, if necessary, it can be further weakened by burning the dry clover. The dead timber is left standing and the problem of disposing of it is postponed and can be spread over a number of years. It is along these lines that most of the later land development in the extreme South-West has occurred and a considerable area of the country in area A was subsequently developed in this way.

Work commenced in area B also about 1923. In the course of the next two or three years settlers occupied 41 blocks divided into two groups. At the present time three blocks are vacant and the remaining 38 are held by 26 settlers. Three of these settlers have other sources of income additional to that from farming and at the time of the survey were not actively working their properties. This area was more heavily timbered than area A; otherwise its development was similar.

In area A two of the six people interviewed were original occupants of their blocks. In area B two were original occupants. These people were able to verify accounts of the details of early settlement in the two localities.

PREVIOUS OCCUPATIONS OF SETTLERS.

The personal factor is of considerable importance in determining the success of settlers on small holdings. In the developmental period of the South-West holdings thriftiness and ability to stand up to long hours of monotonous physical exertion are necessary qualifications. Among the original settlers the most important requirement of all was nearly always lacking, namely, previous experience of dairy farming. Settlement in this region presented problems of greater complexity than those encountered in the development of the wheat belt in the

1903-1914 period when many settlers with no previous farming experience made good. It was therefore of some interest to inquire into the previous occupations of the present holders of blocks in the two areas studied.

About a third of them had had farming experience in England and some of these had been brought up on the land. One of them had subsequently become a professional soldier, another a sailor, and a third had been a farrier before returning to farming as group settlers in W.A. Another had farmed for 20 years in the Great Southern districts before acquiring a group holding. Two had come direct from farming in England to group settlement life. In two other instances the occupants of blocks came from parents who were themselves group settlers. There were four cases in which the owners came from Australian farming families. Thus over 50 per cent. of the present occupants of the holdings which were studied had had previous experience in farming, but only two were the original occupants of their present holdings.

Other occupations represented by the remaining settlers included a timber worker, a mill hand, a wool dyer, a merchant marine officer, a wool traveller and a hospital attendant.

Figure 6.—A later stage.

REASONS FOR TAKING UP GROUP SETTLEMENT BLOCKS.

All the settlers visited were asked why they had taken up group blocks. The answer was usually that prospects looked better than in the occupation which they had left. Depressed conditions in England during the early twenties reinforced the appeal of Government-sponsored propaganda. Even if conditions did not come up to expectations there would at least be better prospects for

their children in a new country. Later comers with farming experience had been attracted by the terms under which unoccupied holdings could be taken up. It was relatively easy for a man with small capital reserves to start farming on a partly developed group holding.

The majority still wanted to be farmers despite the difficulties and set-backs they had experienced, but some of them did not want their children to be farmers.

Figure 7.—The degree of clearing is typical of much of the older pasture country in group settlement areas.

THE PATTERN OF FARMING.

Group settlement in the extreme South-West has been based on the utilisation of land for the production of butter-fat which is in turn dependant on the growing of annual pasture plants in the winter and spring months and the grazing of the dairy stock thereon. During the summer and autumn the dry pasture is supplemented mainly by meadow hay, conserved in the early summer, and by purchased concentrates, usually wheaten bran. In some cases clover and grass silage is made. When surveying the blocks an endeavour was made to include in each a piece of land which retains moisture during the dry summer months so that maize or other green fodder crops can be produced during that part of the year. Not a great deal of use is made of this type of land, however. Cropping with winter growing cereals for early grazing or hay is more frequent, but even that is on only a minor scale.

Farming in the two areas studied conformed closely to the above pattern. For the sake of convenience its chief features may be considered under a number of sub-headings.

(a) *Size of Holding.*

The size of the individual settler's holding ranged from 130 acres to 600 acres. Holdings in area A are larger than those in B. Blocks were surveyed so as to include a minimum of usually 120 acres of what the Lands Department then designated as "first-class" land. The smallest holding comprises only one of the original blocks. The largest are now usually composed of three blocks, on all of which, as a rule, some development has taken place, and which have subsequently been linked together as one holding. For the purposes of assessing the capabilities of a farm the size of holding is a less useful guide than the size of the area sown to pasture.

Figure 8.—In wet, windy weather falling dead timber is a constant annoyance.

(b) *Areas Cleared.*

It is much more important to know the area cleared and sown with pasture. Until the land has been partly cleared, planted with clover, and fertilised with superphosphate, it is a liability rather than an asset. As pasture plants are sown almost at the commencement of clearing operations, it can be assumed that all "cleared land" is in pasture if not being used for cropping. "Cleared land" does not necessarily mean that the land is completely clear of trees. In the majority of cases a considerable number of the larger trees, which have been killed by ring barking, are still left standing (see Figs. 6 and 7). They constitute a serious obstacle to the efficient use of implements and as a number fall each winter their disposal frequently represents a costly drain on the settler's time. In addition, damage to fences and even buildings from falling trunks or limbs is by no means uncommon.

In locality A the cleared areas on holdings vary from 130 to 250 acres. In B the range is from 45 to 130 acres.

The sizes of the holdings and the respective areas cleared are set out in Table 2.

TABLE 2.

SIZES OF HOLDINGS AND AREAS CLEARED AND IN PASTURE.

Serial No. of Holding.		No. of Blocks comprising Holding.	Total Area (acres).	Area Cleared and in Pasture (acres).
Area A—	6	4*	600	250
	4	2	440†	130‡
	2	3	413	160
	5	3	366	150
	1	2	320	180
	3	2	301	130
	Average	...	407	166
Area B—	18	3	500	100
	19	3	453	160
	21	2	334	45
	7	2	321	130
	23	2	317	60
	20	2	315	70
	15	2	290	52
	9	2	258	80
	13	2	230	65
	8	1	222	55
	22	2	199	68
	11	1	162	72
	14	1	160	60
	10	1	158	56
	16	1	154	60
	17	1	154	80
	12	1	130	90
	Average	...	256	77

* Two holdings occupied by father and son and worked together. † Includes land additional to group blocks. ‡ 80 acres on group blocks.

(c) *Pastures.*

On all the holdings visited subterranean clover is, or had been, the chief constituent of the pastures. In area A several of the settlers commented on the fact that it has become much less prominent in recent years. Five of the six settlers interviewed have been experimenting with top dressings of copper sulphate in the last year or two, as investigations by the Department of Agriculture have suggested that much of the country in this area is copper deficient, and that a symptom of the deficiency is the gradual replacement of subterranean clover by drooping flowered clover. In area B, also, several settlers have observed a deterioration in the subterranean clover and are experimenting with top dressings of 5-10 lb. of copper sulphate to the acre. The results have been promising.

On the majority of the holdings in both areas drooping flowered or reverse clover, yellow suckling clover, lotus minor, hop clover, cape weed, barley, spear

and brome grasses are prominent in the pastures. Wimmera rye grass was observed in quantity on only two or three properties.

Perennials are represented by paspalum, Yorkshire fog, kikuyu and to a lesser extent by white clover, perennial rye and Lotus major. Some of these are survivals from pasture mixtures sown on the first patches of clearing following settlement. They are most prominent on flats along streams in area B, and, on certain holdings, are of considerable value in providing a limited amount of green grazing through the summer. On the other hand, the value of kikuyu for the sandy soils of area A was stressed by two settlers. Its drought resisting capacities, ability to respond quickly to rain in the warm early summer and autumn, allied to the fact that when once it is established it is almost impossible for cattle to eat it out, make it a most useful plant.

In the majority of cases pasture management consists of little more than the applications of top dressings of superphosphate, supplemented on some holdings in recent years with a little copper sulphate.

In area A the quantities of superphosphate applied normally ranged from one to two cwts. to the acre and in area B from one to three cwts. The average application in area B is probably heavier than in area A, where the soils are poorer. A number of settlers top-dress during the autumn and again in the spring. The advantages of applying the fertilisers in two lots instead of all in the autumn are problematical, but it is a point which could be cleared up with the aid of a few simple experiments.

Pasture management in these areas has not reached a high standard. In part this is due to the stage of development of the farms, a subject which will be discussed in more detail later.

(d) *Crops and Fodder Conservation.*

The small amount of cropping carried out is a feature of farming in the areas studied. Some settlers grow no crops. Others grow oats occasionally for green feed or hay. However, those who grow from 4-15 acres of oats regularly are in the majority in area B. In area A, most of the land is considered to be too wet in winter for successful cropping.

Summer grown fodder crops such as maize are of considerable value to dairy farmers in this area, as they supply green feed for some time after the pastures have dried off. Unfortunately, the period during which they can be grown in the spring and early summer is normally too short to permit of profitable production, unless the settler is fortunate enough to have an area of "summer" land, *i.e.*, land which retains sub-soil moisture well into the dry period. Several of the farmers in these areas did grow three or four acres of maize each year. Those who are situated along the permanent streams in area B. usually have small areas of river flat on which maize is known to do well, but these flats are usually covered with paspalum and the settler generally lacks the power and equipment necessary to prepare the land for cropping.

The importance of fodder conservation will already have been realised from the comments which have been made on climatic conditions. Nearly all the settlers visited conserved fodder in the shape of meadow hay, but in only one or two instances did the quantities approach the standards considered desirable by the Department of Agriculture, namely, 2½ tons per milking cow.

In the 1941-42 season the majority cut about a ton for each animal milked. In a few cases the quantity was as high as two tons. One man cut 2½ tons per animal. In addition, he made 100 tons of silage and was the only one of all the

settlers visited who conserved fodder in this form. As this property was outstanding in several respects it will be discussed in a later section.

(e) *Live Stock.*

On all farms in the two areas studied milking cows are the most numerous livestock and constitute the chief source of revenue.

In area A. the number carried per farm ranged from 25 to 57, the average being 34. Two of the six settlers had milking machines.

In area B. only one farmer operated a milking machine and he milked 40 cows. The numbers carried by the others ranged from 14 to 25, the most frequent size of a herd being 20.

The ratio of milking cows to other stock was 1.7:1 in area A. and 2:1 in B.

Only one settler did not own a bull. Three owned two each.

From the commencement of group settlement the Government adopted the policy of providing only pedigree bulls for the settlers. The animals had to be from approved stock and of the breed officially recommended for the district. The South-West was divided into zones and one of the popular dairy breeds selected for each zone. Both the areas studied were in what had been the Jersey zone. Now, however, nearly half the settlers use Shorthorn bulls. Two others expressed their intention of changing respectively to a Shorthorn and a Guernsey bull. Another two are already using Guernseys. Seven are continuing to grade up their herds with Jersey bulls.

A number of settlers in both groups have been members of a herd testing unit and use the information so obtained to assist them in culling unsatisfactory animals from their herds.

Those who did not test appear to follow no set policy with regard to culling. When an old cow shows signs of falling away in production she is sold. One settler said he did not keep any cow over 12 years old.

Losses through disease and injury appear to be low. A few animals only had been lost in the past 12 months, usually through injury or from unknown causes. One settler mentioned blackleg as a cause of death and another suspected falling disease had caused the loss of two animals. Two settlers had suffered considerable economic loss consequent upon outbreaks of contagious abortion in their herds.

The survey did not reveal much variation in feeding practice between the farms in this area, though there is probably a fairly wide range in the quantities available for the cows. From April to November green pasture forms the bulk of the ration. In the early part of the season this is usually supplemented with meadow hay. During the summer, dry pasture supplemented with small quantities of bran, is usually the basis of the ration. In some cases small amounts of summer grown fodders are also available.

As will be seen from Table IV, expenditure on animal fodder formed 15 and 23 per cent. of the average outlay in 1941-42, though this included pollard for pigs which was usually a more costly item than bran for the cows.

Pig raising in these areas is carried on almost solely as a means of turning otherwise waste skim milk into cash. All the settlers visited carried pigs at some time of the year. The majority carried one or two breeding sows. One had four and another three. Five bought their pigs as stores or weaners and did not carry breeding sows. One of these men who bought and sold considerable numbers of pigs said it did not pay him to keep breeding sows through the lean period in late summer and autumn.

All except two farms carried working horses. Nine had one animal apiece; ten carried two each; one had three and another five.

(f) *Implements and Machinery.*

Typical equipment consisted of a single furrow mould board plough or a light two-furrow disc plough, a mower, harrows, a cart and a cream separator.

In area A. all six settlers owned utility trucks. In area B. five owned utilities and three owned cars. The remaining nine had no motor vehicles. In almost all cases the utilities and cars were old models.*

Thirteen of the 23 settlers owned hay rakes, six owned milking machines and seven had stationary engines. Five, of whom four were in area A., owned power driven chaff cutters. Three others had hand chaff cutters. Three had drays and four owned car or truck chassis converted to wagons. Four owned fertiliser distributors. Only seven had windmills and one had a motor operated pump.

Figure 9.—A settler's cottage in area B. Note the dairy in loft background and hay shed beyond the house.

(g) *Buildings.*

On all holdings visited the houses were the original cottages erected at the commencement of group settlement. (See Fig. 9.) Although probably intended as temporary dwellings for the developmental stages of the holdings, they appear to have become permanent habitations. When erected they lacked inside lining and bath rooms. The majority are still deficient in both these items. On practically all the farms visited the sole water supply for the house consisted of one or two 1,000-gallon tanks filled by run-off from the roof.

* In area B., in which the more distant farms were 15 miles from the settlement, there was a surprisingly good delivery service for mail, meat, bread and groceries, and also facilities on one day of the week for settlers to visit the township. In both districts cream is collected by motor truck.

Outbuildings found on all the farms visited were a hay shed or barn, a cow shed, a dairy and pigsties. Several settlers had a chaff shed, a machinery and implement shed and a garage for the car or truck. In a few instances the outbuildings were good substantial structures, though in the majority of cases they were of a simple design and construction.

PRODUCTIVITY OF FARMS.

Information was sought concerning the amount of produce sold during the twelve months preceding the visit and about items of farm income and farm expenditure. As the majority of the settlers keep no detailed records it will be realised that some of the figures presented in the next two sections must be regarded as approximations, particularly those which refer to items of expenditure which come under the term "sundries." On the other hand, the main items of income and expenditure, such as proceeds from cream and pigs and expenditure for fertiliser, feeding stuffs and interest, are likely to be fairly accurate in nearly all cases, and it is thought that the figures presented do give a reasonably true picture of conditions on these farms.

The dependence of the settlers on the sale of butter-fat, surplus dairy stock and the pigs to utilise the skim milk is shown by the fact that revenue from these three sources constituted over 99 per cent. of their income in the twelve months preceding the survey. Only three settlers had any income from farm products other than these. One man received £30 from eggs, poultry and sheep, another £15 from potatoes and the third £15 from potatoes and fruit.

In area A settlers derived 77 per cent. of their gross incomes from the sale of cream, 14 per cent. from the sale of pigs and 8 per cent. from the sale of surplus stock. In area B the quantities were 70 per cent., 19 per cent., and 11 per cent. respectively. It is obvious from these figures that it is efficiency in cream production which determines the financial outcome of the farming operations and it is therefore of interest to examine the several measures of this efficiency.

(*a*) *Production per Acre.*

In terms of lb. of butter-fat per acre of pasture, production in area A ranged from 24 lb. to 49 lb. per acre, with a simple average for the six settlers of 40 lb. However, as the settler with the lowest production had been employed on other work for some time and was carrying only about half his normal complement of cows, it would be fairer to exclude him. The range then became 32 lb. to 49 lb. for an average of 42 lb.

In area B, where soils were better but areas smaller, production ranged from 30 lb. to the acre to 71 lb. to the acre. In this district one of the settlers was in a Garrison battalion and three were employed on a small timber mill in addition to carrying on their farms with the aid of their families; production from their holdings suffered accordingly. If they be excluded, the range of production is 39 to 71 lb. per acre with a simple average of 54 lb. per acre. Productivity per acre is influenced by soil fertility, area of summer land on holding and quantity of fodders bought, in addition to the ability of the farmer.

Despite the higher yields in area B, gross production per holding was higher in area A as the average area of pasture per holding was 166 acres compared with 77 acres in B.

(*b*) *Production per Cow.*

There was a wide variation in the average production of butter-fat per cow. It ranged from as low as 125 lb. to as high as 325 lb., though 50 per

cent. of the cases came between 200 lb. and 270 lb. The highest production was achieved on the farm previously referred to in the section dealing with fodder conservation. This settler carried one milking cow to 6½ acres of good pasture and in consequence was able to practise rotational grazing and to make liberal provision for conserving fodder.

FARM INCOME AND EXPENDITURE.

Details of farm income for the season under review are given for the two localities in Table III.

TABLE III.—GROSS INCOMES IN 1941–42 ACCORDING TO SOURCE, TOGETHER WITH GROSS INCOME PER ACRE OF PASTURE.

Farm No.	Income from Sale of—				Total Gross Income.	Gross Income per acre of Pasture.
	Cream.	Pigs.	Surplus Cattle.	Other Commodities.		
Locality A—	£	£	£	£	£	£
1	560	244	46	...	850	4·7
2	325	74	60	...	459	2·8
3	431	123	88	...	642	5·0
4	240	36	6	...	282	2·2
5	400	102	50	...	552	3·7
6	741	162	150	...	1,053	4·2
Average per holding	449	123	67	...	639	3·8
Proportion of total receipts	70%	19%	11%	...	100%	...
Locality B—						
7	390	120	47	30	577	4·5
8	200	60	...	...	260	4·8
9	222	20	32	...	274	3·4
10	200	...	...	...	200	3·6
11	200	18	20	...	238	3·2
12	200	15	3	...	218	2·4
13	300	50	20	...	370	5·8
14	200	40	50	...	290	4·9
15	230	23	...	...	253	5·0
16	269	44	32	...	345	5·7
17	220	28	...	...	248	3·1
18	219	25	80	...	324	3·2
19	450	100	85	15	650	4·0
20	214	60	18	...	292	4·2
21	158	53	...	...	211	4·7
22	283	59	28	...	370	5·4
23	282	60	19	...	361	6·0
Average per holding	249	46	23	2	320	4·2
Proportion of total receipts	77%	14%	8%	1%	100%	...

Attention has already been drawn to the high degree of dependence of all farm incomes in the localities studied on the production of butter-fat. There is a fairly wide range in the figures for income per acre of pasture which is due partly to differences in soil fertility and partly to differences in management.

The larger size of cleared areas in locality A. is reflected in higher gross incomes. Locality B., on the other hand, shows a slight advantage in average income per acre despite development being not so far advanced as in A. Better land is probably the reason for this.

TABLE IV.

FARM EXPENDITURE IN 1942 TOGETHER WITH GROSS EXPENDITURE PER ACRE OF PASTURE.

No.	Expenditure on—							Gross Expenditure per acre of Pasture.
	Interest.*	Feeding Stuffs.	Fertiliser.	Stock.	Hired Labour.	Other.	Total.	
Area A—	£	£	£	£	£	£	£	£
1	55	120	80	110	150	70	585	3·2
2	60	51	33	8	34	65	251	1·6
3	64	40	81	...	...	136	321	2·5
4	32	40	36	12	50	15	185	1·4
5	31	44	50	...	...	89	214	1·4
6	134	14	60	82	50	54	394	1·6
Average per Holding	63	51	57	35	47	71	325	2·0
Proportion of Total Expenditure	19%	15%	17%	10%	14%	25%	100%	
Area B—								
7	43	55	50	5	75	20	248	1·9
8	45	52	17	...	75	13	202	3·6
9	44	20	45	...	...	38	147	1·8
10	48	4	24	...	...	10	86	1·5
11	38	29	26	...	50	10	153	2·0
12	46	16	23	10	...	10	105	1·2
13	36	70	36	...	...	15	157	2·4
14	55	25	30	25	46	27	208	3·5
15	29	43	46	...	...	37	155	3·0
16	36	50	25	14	33	25	183	3·0
17	38	10	26	5	50	15	144	1·8
18	70	80	20	...	...	30	200	2·0
19	88	30	60	...	5	74	257	1·6
20	25	25	42	5	...	15	112	1·6
21	60	62	22	...	...	21	165	3·7
22	33	18	20	19	4	38	132	1·9
23	35	50	25	...	...	12	122	2·0
Average per Holding	45	38	31	5	20	22	162	2·1
Proportion of Total Expenditure	28%	23%	19%	3%	13%	14%	100%	

* In some cases a small amount of the sum shown is for repayment of principal.

FINANCIAL POSITION OF SETTLERS.

The data from Tables III and IV have been combined in Table V, which shows net income from farming operations over a period of 12 months. Although no account has been taken of the value of improvements and of differences in value of stock and plant on hand at the beginning and the end of the period, nor for depreciation, it is considered that the accuracy of the general position as shown in the table will not be seriously impaired. Net incomes ranged from as low as £58 on a holding which a settler had only recently taken up to as high as £659 in one of the cases where a settler worked two properties.

In column five net incomes per acre of pasture have been given. They range from as low as £0.8 per acre to as high as £4.0 per acre, the average for region A. being £2.0 and for region B. £2.1.

In column six is shown the amount of Agricultural Bank debt on the property. In most cases a proportion of this relates to stock and plant. The remainder is on the land. Apart from one or two instances where small sums have been borrowed privately, and which have been disregarded in the table, all the debt is held by the Agricultural Bank.

Table V.

FARM INCOME, EXPENDITURE AND INDEBTEDNESS PER ACRE OF PASTURE, 1942.

	Gross Income.	Gross Expenditure.	Net Income.	Net Income per acre of Pasture.	Indebtedness.	Indebtedness per acre of Pasture.
Area A—	£	£	£	£	£	£
1	850	585	265	1·5	1,067	5·9
2	459	251	251	1·2	1,205	7·5
3	642	321	321	2·5	1,129	8·6
4	282	185	97	0·8	660	8·2
5	552	214	338	2·3	1,197	8·0
6	1,053	394	659	2·6	2,447	9·8
Average	640	325	315	2·0	1,244	8·1
Area B—						
7	577	248	329	2·6	807	6·1
8	260	202	58	1·1	685	12·5
9	274	147	127	1·6	885	11·0
10	200	86	114	1·6	510	9·1
11	233	153	80	1·1	767	10·6
12*	218	105	113	1·2	772	8·6
13	370	157	213	3·4	722	11·1
14	290	208	82	1·4	922	15·4
15*	253	155	98	1·9	500	9·6
16	345	183	162	2·7	722	12·3
17	248	144	104	1·6	702	8·8
18	324	200	124	1·2	1,300	13·0
19	635	257	377	2·4	1,725	10·7
20	292	112	180	2·6	510	7·3
21*	211	165	46	1·0	520	11·5
22	370	132	238	3·5	520	7·7
23	361	122	239	4·0	712	11·9
Average	321	163	158	2·1	781	10·2

* Owner working on neighbouring sawmill or serving in garrison battalion.

DISCUSSION.

The preceding sections of this paper have been devoted to the presentation of the factual information collected in the field; those which follow will be concerned with analysing it and discussing possible future developments.

(a) *Size of Productive Area.*

Although the farms studied are too few in number to constitute a representative sample of all group settlement holdings they are undoubtedly typical in many important features and certain conclusions which can be drawn concerning them would apply to the majority of group settlement holdings. This would almost certainly be true as applied to the extent of development which has so far taken place. On many of the holdings the areas cleared and laid down to pasture are too small to provide a decent living for a family. On most the presence of large quantities of

dead, standing timber in the pasture paddocks constitute a serious obstacle to cultivation and a constant drain on the settler's time. (Fig. 8.)

The importance of size of developed holding as a factor making for success cannot be clearly demonstrated from the relatively few observations which were made in this study, but is undoubtedly the most important one.* No settler who showed a difference of £300 or more between cash receipts and cash expenditure had less than 130 acres of pasture. Some farmers who were operating holdings smaller than the average had net cash returns of £3 to £4 per acre of pasture, but their net income was lower than that received by others with larger holdings who obtained only £2 to £3 per acre of pasture.

An interesting comparison was afforded by two settlers in fairly close proximity to one another. In 1942 one of them milked 22 cows on 55 acres of pasture. His gross income was equivalent to £4.8 per cleared acre. The other milked 20 cows on 130 acres and had a gross income equivalent to £4.5 per cleared acre. The first man obtained an average of 140 lb. of butter fat per animal from his 22 cows and had a net income for the year of £58. The other obtained 325 lb. of butter fat per cow and showed a net income of £329. Although the personal factor was of importance in this case it is nevertheless an excellent illustration of the economic waste occasioned through settlers working on holdings which are too small to permit of efficient utilisation of manpower. The criterion of success is most certainly not high yields per acre but rather maximum return per person engaged. No matter how hard the first man works he cannot greatly increase his income on account of the limitations imposed by climatic conditions in the production of butter-fat per acre. He is already operating inefficiently in that he could achieve the same results if he replaced his cows with half the number of high producers which he would then be able to feed well. As it is he is considerably overstocked. This tendency to stock up to the number that one man can milk, irrespective of available feed supply, appears to be characteristic and it is probably correct to say that most of the smaller holdings in the group settlement areas are overstocked.

The relationship between success and size of productive area appears to have been realised by the second man when he took up his farm in 1930. At that time there was an area of 29 acres cleared and 14 part cleared and it carried 11 milking cows. He relates that after a few weeks trial he approached the Agricultural Bank with the ultimatum that if he were not allowed to sell some of his cows he would destroy them. He was allowed to sell them. He then set out to clear more land. In the first year he cleared seven acres and in the second five. In neither year did his gross income reach £100, yet with this and the £150 capital with which he started he had to support a wife and two children and work extremely hard himself. He considers that his success dates from the day when he sold his cows and settled down to clear land. He has evolved a technique for bringing land into production at a cost which he estimates at about £5 per acre. After ringing, slashing and burning, the land is sown with subterranean clover, and superphosphate is applied at the rate of three cwts. per acre. During the first year it is not grazed but used to carry a fire when it has dried off. After this second burn little trouble is experienced with regrowth of scrub. In the summer-moist land in the gullies his practice is to apply large dressings of fertiliser in the early years following slashing and burning and to stock heavily.

* It is possible that, as the land becomes more suitable for cultivation, settlers will be able to increase productivity per acre by adopting a system of farming involving greater attention to crop production and better pasture management. At present, however, it is evident that a prerequisite of success is to have a sufficient area of developed pasture. The amount now considered adequate is considerably in excess of what was anticipated when group settlement commenced.

The minimum area necessary for a farmer to achieve a decent standard of living depends on a number of factors. Assumptions have to be made about prices and living standards. Under conditions similar to those under which the survey was made, with butter-fat worth about 1s. 6d. per lb. and a capitalisation of £8-£12 per acre of pasture, it does not appear unreasonable to expect the average settler to attain a net income of £2 10s. per acre of pasture. If a difference of £300 between farm revenue and expenditure can be regarded as adequate provision for a satisfactory living standard then 120 acres of pasture would be the goal at which to aim. A number of settlers already have more than 120 acres cleared. To bring all the holdings at present occupied up to the standard might involve the clearing of another 40 to 50 thousand acres of country and would bring the area of sown pastures up to 200,000 acres. It is true that improvement in the type of pasture plant and in pasture management will increase productivity per acre in the course of time, but improvements in this direction are not likely to be rapid and may not be great in total. It seems, therefore, that a productive area of 100-120 acres ought to be the very minimum aim for dairy farms.

Experience in other parts of the South-West that have been settled longer than the group areas suggests that the most profitable farms are those which combine several enterprises such as dairying, fruit growing, stock fattening and potato growing. If this type of development is envisaged for areas of new settlement then it would appear that the minimum area of good soil on a holding should be not less than 200 acres.

Group settlement experience suggests that it would be necessary to set aside an average area of 250-300 acres per holding in order to provide that area of productive land.

A farm with 100 acres of pasture gives the one man dairy farmer a reasonable chance of a living, though the social desirability of the one man farm, where the operator is tied to his job for 365 days in the year, may be open to question. Theoretically it should be possible for all the cows to be dried off for a period of several weeks in autumn, but in practice it appears to be seldom done, partly on account of the difficulty involved in arranging calving dates with any certainty.

If labour is to be employed a considerable step up in the productivity of the farm becomes necessary, particularly if farm labour is to operate under an industrial award. This in turn means an increase in productive area. The same argument holds good for the introduction of a milking machine. The mechanisation of the dairy industry is likely to increase after the war and mechanisation invariably means that potential output per man is increased. The implications which mechanisation has for Western Australian agriculture, not only at home but in other countries, in the post-war years will need the most careful study when further land settlement is planned. Increased competition for markets will demand higher efficiency here and that probably can be obtained only by ensuring that labour is employed economically and that producers are not handicapped by having to operate on holdings too small to permit of their taking every advantage of technological advances, particularly in the field of mechanisation.

(b) *Clearing.*

It has been recognised for years that the economic success or failure of land settlement in the heavily timbered areas of the South-West is mainly dependent on the costs of clearing the timber and bringing the land into production. It might therefore be expected, in view of the heavy losses incurred by the Government in settlement schemes, that a considerable amount of precise experimental data would be available by now concerning the relative efficiency of different

methods of clearing. It is unfortunate for those who may have to do the planning of future settlement schemes that this is not so. It is true that there is considerable experience scattered amongst numbers of people who have first-hand knowledge of the past 20 years of South-West development, but their information is neither ordered, precise nor readily available, and on many points it is probably conflicting.

No one can say with any certainty whether it is better to put inexperienced men on virgin country and support them and their families through the long period required to bring their farms to a reasonable state of productivity, or whether economies could be effected by having large areas partly cleared and sown with pastures before settlement is made. Might not power saws and diesel crawler tractors be far more efficient than men working as scattered individuals with axes and mattocks?

In view of the long term disability which is imposed upon the farmer by the existence of dead standing timber, might it not be economical to clear a settler's holding completely, say ten years after the timber has been rung, using explosives and the most modern timber handling methods? Experiments along these lines appear to be among the most obviously necessary post-war reconstruction measures for the South-West.

(c) *Farm Lay-out.*

Faulty location of the house and buildings, either in relation to one another or to the land, was obvious on several of the holdings visited. When the settlements were established the official policy was to allow inexperienced settlers and foremen (who frequently knew little more than the settler) to be responsible for the lay-out of the farm. In a number of cases the results have been unfortunate for the subsequent occupants of the block and have imposed a permanent handicap on efficient working.

The choice of location for the 25 acres of initial clearing appears in some instances to have been determined rather by the ease of clearing than by the suitability of the soil for immediate development.

There is some indication in area B that attention to the possibilities of soil erosion in this type of country will be necessary in the future. A considerable amount of cleared land is on slopes, some of which are fairly steep. The rainfall is heavy but most of it falls at a time when the surface of the ground is covered with green herbage. So far, symptoms of soil erosion have not been sufficiently noticeable to cause comment, but here and there are to be seen the start of gullies that may later develop to serious proportions. As the land is cleared of dead timber and cropping becomes more general, the problem is likely to become more serious. Technical guidance in laying out paddocks so as to reconcile the present need for rotational grazing with probable future needs for the use of mechanised cultivation and harvesting implements and cropping on the contour system, is highly desirable should further settlement be undertaken. The same comment applies to the location of building sites and ground water supplies. Planning the farm should not be based on the assumption that farming practices will remain static; rather should it be done in the light of intelligent forecasts as to the future course of trends discernible at present.

The importance of having a thorough knowledge of the soils of a district and their agricultural potentialities before establishing settlement or deciding upon the best size and type of farm, seems so obvious as to be hardly worth mentioning. But administration of South-West settlement has been characterised

until relatively recent years by a failure to use even the small amount of scientific information then available concerning soils. Even now, with the prospect of having to plan for further settlement in the same type of country, there appears to be an inadequate realisation of the valuable basic contribution which can be made by the soil survey.* A different attitude prevails in the U.S.A.

As an indication of what the scientific approach to land utilisation problems means the 1941 annual report of the Chief of the Soil Conservation Service of the U.S.D.A. is quoted:—

"Detailed physical surveys—conservation surveys—of soils, slope, erosion, and land use were made on 35,520,000 acres of agricultural land. . . . The 1941 fiscal year's work brings the total acreage covered by detailed surveys to 98,925,000. The information gathered by these surveys is indicated on enlarged aerial photographs to be used by farmers and farm planning technicians in working out farm conservation plans. . . . Soil and water conservation programmes cannot be based on physical factors alone, as a rule. Economic and social matters must be considered as well. Methods have been evolved of inventorying such elements as income, taxation, tenure conditions and similar non-physical features that influence the practicability and effectiveness of land use adjustment to meet the needs of conservation."†

(d) *Farm Practices.*

Reference has already been made to the relative simplicity of the patterns of farming at present being followed in the region studied. Butter fat production is carried on by means of grazing cows on annual pastures, some of which are cut and fed as meadow hay and supplemented with purchased concentrates in the dry months. Cropping is a minor activity on some of the farms, carried on only to provide green feed or hay for the stock. The only sources of income other than butter-fat are surplus cattle and pigs.

One good feature of this type of farming is that it should lead to a steady increase in the fertility of the soil. The paddocks receive annual dressings of superphosphate and the chief introduced plant is a legume (subterranean clover). No cash crops are removed from the farms and the amount of phosphate taken off by butter fat and the few pigs and cattle that are sold is small in comparison with what is added.

It has to be realised, however, that the Mediterranean type of climate, when unmodified by irrigation, imposes fairly strict limits on the productivity of the soil. In the summer the annual pasture plants die off and do not come away again until the autumn rains. Perennials such as kikuyu, phalaris and, in the more favoured localities, white clover, rye grass and Lotus species will survive the summer, but unless they are in moist situations they are not particularly productive. They are of value, however, in that they come away quicker than annuals after the first rains and continue green longer into the summer. Production can only be carried on in the dry months if provision is made for fodder conservation and hand feeding. Production costs are thus raised. It is easy to suggest means whereby the productivity per acre of most of the holdings could be increased. It is more difficult to suggest how, in their present financial position,

*It is not suggested that all officials have failed to realise the value of this type of work as a preliminary to land settlement, nor that official disregard extends to all the other points raised in this section of the paper. Already tentative schemes for the post-war years are in existence which include provision for remedying some of these defects.

†The value of this sort of information to local committees responsible for formulating conservation plans for their districts is discussed in U.S.D.A. Farmers' Bulletin 1853.

many of the settlers are to accomplish it. For example, it is possible that the incorporation of Phalaris tuberosa in the pasture mixtures would be profitable in the long run. But for the successful establishment of this grass it is necessary that the soil be thoroughly prepared so that in the early stages competition from other plants is reduced to a minimum. The cost of seed is at least 10/- per acre and little return in the shape of feed can be looked for in the first year. In subsequent years a higher standard of pasture management than formerly would have to be attained if the potentialities of the grass were to be realised. To the farmer with two or three hundred acres of cleared land and good plant and equipment, the establishment of ten acres or so of phalaris each year would present little difficulty. The settler trying to get a living from 50-60 acres would find it impossible. He would lack both the time and equipment to prepare the land and would not be able to find the cash to pay someone else to do it and to buy the seed. Even more important, he could not afford to have one of his paddocks lying idle for a year and would probably not be able to practise the necessary rotational grazing after the grass was established.

It is not suggested that all holdings are too small for their present occupants to work successfully. There are some who do not take full advantage of the existing opportunities, for example, the Government controlled herd testing scheme, but there are undoubtedly others who would adopt improved practices were they at a stage of development where they could do so. It would seem obvious that in such cases it would be sound policy to assist this type of settler to develop his holding as quickly as possible.

As holdings are developed it is likely that stock raising for meat production and the growing of cash crops and fruit will increase in importance relative to dairying. Mechanisation of the dairying industry can be expected to increase. More thorough clearing of the land together with the co-operative use, or the hiring of power-driven implements, will facilitate the growing of fodder crops or cash crops such as potatoes and tobacco.

The need for a research farm where the best technique for land development can be worked out is apparent. At such a centre attention could also be given to the introduction, selection and improvement of new crop and pasture plants, the most profitable combinations of farm enterprises and the possibilities for small scale summer irrigation from streams and wells.

(e) *Credit.*

The indebtedness of each holding for land, stock and plant is shown in columns 6 and 7 of Table V. The debt shown there is all owed to the State controlled Agricultural Bank. As it was known that additional sums that might be owing to stock and machinery firms were relatively negligible in total, no information was sought concerning them.

Present indebtedness is not necessarily a reflection of the relative costs incurred in developing the holdings nor of their present values. The figures represent the amount of debt considered reasonable in 1936, modified in some cases by subsequent repayments of principal or advances for stock. The revaluation of 1936 appears to have been the first in which a serious attempt was made to base values on the earning capacities of the holdings.

It was not possible to obtain much information about the actual amounts written off in particular cases for the official records have been destroyed. However, the officer who carried out the revaluation estimates that present values would represent approximately 30-35 per cent. of the total debt incurred in

connection with the development of the blocks. A further loss would be incurred on the blocks which were completely abandoned.

Revaluation on the basis of productive capacity was a big step forward and has been particularly advantageous to recent comers with capital of their own. It has not always been equitable as between recent arrivals and those who have remained from the early days. The productivity of a holding depends in part on the amount of work put into it by the occupier. In the cases where, by dint of hard work and self privation, a settler has been able to meet his commitments, he has not received much benefit from the revaluation.

In the absence of any considerable volume of land sales in these areas it is difficult to obtain much reliable information about the market values of properties. However, sales of well developed properties, similar in type to those studied, are said to have been by no means unusual in recent years, and to have taken place at a figure usually well above the amount of the mortgage. This is not surprising for farms on which the settler has been able to increase the productive area since the valuation was made. The farm referred to previously (No. 7) is one which would have a market value very considerably in excess of the mortgage.

So long as the cost-price ratio does not move against the producer it seems as though the majority of these settlers in the districts studied who have more than 100 acres in pasture will not encounter any serious difficulty in meeting their interest payments. The outlook is less attractive for those in the less well developed holdings. Unless those settlers can increase their area of developed land they cannot improve their financial position to any great extent. If they have to milk 18-20 cows singlehanded, as many of them do, they are likely to make little progress in clearing new land.

At present the Agricultural Bank will not make advances for clearing new land. Refusal to do so for the young and energetic among the settlers might seem a short-sighted policy were it not for the fact that shortage of superphosphate constitutes an effective bar to further developmental work.

After the war it would appear to be sound policy to make capital readily available to those who can use it efficiently and so enable them to develop an adequate living area to the productive stage as quickly as possible. If farming is to attract the ambitious and intelligent it must offer opportunities for advancement about equal to those in other walks of life. Advances in mechanisation and other fields of technology continue to foster the trend towards larger holdings and greater capital equipment and the provision of a sound system of agricultural credit becomes increasingly important.

(f) *Living Conditions.*

In recent years some publicity has been given to rural amenities with the object of bringing the living conditions of country people more into line with those of city dwellers. As an American writer has pointed out, "The ease with which a settler can communicate with his neighbours, send his products to market, get his children to school and take part in the general life of the community determines to a large degree whether he will be successful or unsuccessful on his farm." Although this investigation was concerned more with economic than with sociological aspects of the settler's problems, the necessity for some improvement in this direction was clearly to be seen in the areas studied.

The majority of the dwellings are the cottages erected nearly twenty years ago when settlement first started. They were of unlined weatherboard and no

provision was made for bathrooms. The water supply was a single 1,000-gallon galvanised iron tank fed by run off from the iron roof. In some instances improvements have been effected to the cottages but in a number of cases the only change is the gradual dilapidation wrought by time and weather.

There are doubtless reasons for this failure to improve living conditions. Some settlers cannot afford to spend the money and, in any case, might be unwilling to do so on account of a feeling of insecurity and uncertainty about the future, or an intention not to settle permanently on a holding in which they might hold little equity. Others in better financial circumstances may have become accustomed to their present accommodation, and prefer to spend their available money in other ways. However, it is undoubtedly true that a fairly close correlation would be found to exist between income and quality of housing and that an improvement in farm incomes is a necessary step in raising housing standards.

Community activities and entertainments in the two areas studied were few and had declined in importance since the early days of settlement. The radio (sets were owned by the majority of the settlers visited) made the older people less inclined to go out in the evenings. Improvements in transport made it possible for the younger people to select their amusement from the wider range offered by the country town rather than to organise their own small dances and socials. However, it appeared from conversations that in the field of sport the small-community spirit was very much alive. Until curtailed by the war local district cricket and football competitions were popular and keenly anticipated by a large proportion of the settlers. The possibility of officially fostering sporting activities, not only for their intrinsic value, but also as a basis for community action along other socially desirable lines, ought to be worth serious investigation in connection with future land settlement schemes.

SUMMARY.

This is a study of 23 settlers in two districts in the extreme south-west of Western Australia in an area in which development was commenced some 20 years ago under the Group Settlement Scheme. The purpose of the study was to learn something of the past history, present position and future prospects of these settlers. Information was obtained by means of personal visits.

Dairying for the production of butter-fat was the main activity on all the farms visited. Subsidiary sources of income were pigs and surplus dairy cattle. The size of herd varied from 14 to 57 milking cows. Six settlers had milking machines. The main items of expenditure for the majority of the settlers were interest on mortgage, superphosphate and purchased feeding stuffs, mainly bran and pollard.

The cleared productive areas of the farms ranged from 45 to 250 acres; 14 had less than 100 acres cleared and sown to pasture. Little attention was paid to cash crops. It was evident that in order to improve their financial position a number of settlers needed to develop more land. There was evidence of over-stocking on the smaller holdings. Net increase in 1942 ranged from £46 to £659. No settler with an area of pasture less than 130 acres had a net income of more than £300.

On most of the holdings dead standing timber constituted an obstacle to cultivation and when it fell, a drain on the settlers' time. Faulty lay-out of buildings and paddocks was evident on several holdings.

Mortgages were held entirely by the State operated Agricultural Bank. Present indebtedness per acre represented probably only one-third of the amount actually spent since settlement commenced.

Housing conditions and domestic water supply on a number of the holdings were below what could be regarded as a reasonably adequate standard.

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Fertiliser Rationing in Western Australia, 1944.

K. Needham and L. J. H. Teakle.

Fertiliser rationing has been in operation since December, 1941, and in June, 1944, the Australian Agricultural Council met to discuss proposals for the 1944-45 rationing year. In brief, it was decided that the system of crop priorities which has been in operation should be retained for the current rationing period, and that dairy pastures should receive as nearly as possible 100 per cent. of the 1939-40 usage. The receival of normal dressings for dairy pastures is, of course, governed by the production on which the supplementary allowance is made available over and above the basic allowance for non-dairy farmers.

The Agricultural Council decided that the quota for Western Australia should be 193,755 tons of superphosphate plus an expected 2,000 tons from locally produced rock. This quota means that in general non-dairy farmers will be able to receive approximately 55 per cent. more than the 1943-44 ration, and dairy farmers over and above the 55 per cent. basic increase will receive approximately a further 20 per cent. increase on the dairy supplement allocated last year.

In order to assist applicants for fertiliser during 1944-45 the following information is submitted:—

A.—NON-PRIORITY CROPS.

For the year 1944-45 it has been agreed to operate a modified rationing scheme involving a return as far as possible to pre-war conditions where the relations between the farmer and his agent are concerned. It is desired to eliminate as far as possible the need for the farmer to approach the Rationing Office with his farming programme and claim for a quota of superphosphate, as every endeavour has been made to establish a quota for every farm in Western Australia under wartime conditions. The requirements of practically all farmers in the State were investigated in 1943-44 and the latter year in most instances will provide the basis for future quotas, while rationing is in progress. Under these circumstances the State's quota of superphosphate can be allocated to the farmer by allowing each a percentage increase on the ration obtained in 1943-44, excluding that allowed for priority crops or the dairy supplement.

Under these circumstances the farmer may contract for his requirements of superphosphate through his agent or manufacturer in the usual way, and the Rationing Office will function only in so far as it will examine each contract so as to ensure that the order is restricted to the entitlement for each property. The Rationing Office is examining all quotas in advance and will have all the necessary records for handling these contracts when they are presented by the agent or manufacturer. In order to facilitate the work of the Rationing Office and to expedite the clearance of contracts, each contract should be for the full year's requirements of the farmer up to the 30th June, 1945, and this should be submitted as early as possible.

For the guidance of applicants the following points are made in respect of non-priority applications:—

1. For all farmers who purchased superphosphate in 1943-44, fertiliser requirements must be contracted for and ordered through an agent or manufacturer as in pre-rationing years.

2. The Fertiliser Rationing Office does not require an application form except in the case of those who did not purchase superphosphate in 1943-44 and for whom a basic quota will have to be established. In these cases the 1943-44 white application form should be used and the applicant should take care to answer all relevant questions as listed in the covering note attached to the application form. In support of the application the following information must be shown as far as possible—

   a. The previous owner of the property, if any.
   b. Superphosphate used in pre-rationing years. It should be noted that 1939-40 is generally used as the pre-war basis.
   c. If such particulars are not available, a statement from an institution such as the Agricultural Bank, giving all possible details in order that a reasonable assessment of the previous farming activities may be made.

3. Farmers are requested to contract for the full amount of their requirements at the one time wherever possible, and in stating these requirements should bear in mind the limitation imposed by the shortage of supplies for the year. By contracting for full requirements this does not mean that the farmer is under an obligation to take delivery of the whole quota at the one time. Once the

contract has been presented to the Rationing Office and the quota approved, arrangements for despatch of the order may be made when presented at the works.

4. For wheat, pastures, and other non-priority crops the actual tonnage of superphosphate to which each farm is entitled will be determined by adding the percentage increase (normally 55 per cent.) to the basic quota purchased during 1943-44 for these crops. In the case of dairy farmers, the dairy supplement will be treated separately and will be eligible to receive an increase of 20 per cent. on the figure made available last year. This dairy supplement increase of 20 per cent. will be added to the figure available for the non-priority crops.

5. The contract or order will be submitted to the Fertiliser Rationing Office by the agent or manufacturer nominated and a permit to cover the ration will be issued for each farm or farming unit and returned to the agent or manufacturer. The permit will not be made available to the applicant and, in consequence, the distributor nominated will be expected to advise the farmer of his quota for the year.

6. Where farmers are operating more than one farm or farming unit, for each of which a separate allocation of superphosphate was received in 1943-44, particulars must be shown on or with the contract or order specifying the farms or farming units covered and stating the tonnage of superphosphate required for each. Applicants should take particular care to apply in the same name as that used on their applications when applying for superphosphate last year.

7. The Rationing Office feels that the majority of quotas will have been examined for 1943-44 and that there should be little occasion for appeals. Applicants are requested to restrict appeals to a minimum and to refrain from appealing unless they feel that they have further information to submit in support of their claim over and above that which was supplied during 1943-44. If an appeal is necessary it should be made direct to the Fertiliser Rationing Office and not through the local agent.

8. Contracts should be in the hands of the Fertiliser Rationing Office on or before the 31st January, 1945, and final orders must be in the hands of the manufacturers by the 30th April, 1945.

9. As in 1943-44 no superphosphate will be available for new sowings of pasture or for recreation areas.

10. Nitrate of soda is available for orchards and vineyards at the rate of 3 cwts. per acre, and for summer fodder crops such as maize and sudan grass at the rate of 1 cwt. per acre. When contracting for the purchase of nitrate of soda the area of the orchard, vineyard or crop for which this fertiliser is required should be shown.

11. *Potash.*—Supplies of potash are now available and have been considerably supplemented by local production. Because of the availability of this fertiliser it has been found unnecessary to continue the release of it under permit, and accordingly growers may obtain supplies of potash without any application to the department.

Dairy Farmers and the Dairy Supplement.

All dairy farmers must make a special claim for the dairy supplement and support this claim by a signed statement certifying that the dairy activities are substantially the same as in 1942-43, which was the base year for the allocation of the 1943-44 supplement. Application for the dairy supplement should be made as follows:—

"I certify that I am engaged in dairy activities to substantially the same extent as at the time I applied for the dairy supplement in 1943-44, and request the supplement on the same basis for 1944-45."

In some cases it is anticipated that there will have been a substantial change in the dairy activities and in these cases the applicant must give documentary evidence of the 1943-44 production, in order that the appropriate adjustment may be made. In these instances the application for the supplement should be as follows:—

"My dairy activities have substantially changed and in support of my application for a dairy supplement I submit the attached returns of dairy production for 1943-44."

Without this evidence no dairy supplement will be allowed.

In some cases the distributors are incorporating such a certificate on their contracts, while in others it is necessary for the applicant to write out his own certificate.

In order to assist in the equitable distribution of the supplement, officers of the Dairy Branch are advising the Fertiliser Rationing Office of any substantial changes in dairy activities which come under their notice in their respective districts.

B.—PRIORITY CROPS.

For priority crops the arrangements for rationing in 1944-45 will be substantially the same as in 1943-44. The principal modification is the requirement of all farmers to do their business through a nominated agent or manufacturer. The application forms duly completed may be sent to the Fertiliser Rationing Office through the agent or direct from the farmer. The permit for the quota of fertiliser made available will be forwarded to the agent or manufacturer nominated and not to the applicant.

In the case of blood and bone, in order to distribute the available supplies more effectively it has been decided to tie applicants to the produce merchant nominated as is the case with meatmeal. It is therefore advisable for applicants to present their application form to the selected produce merchant in order that he may endorse the form before presentation to the Rationing Office. Permits for blood and bone fertiliser will not be transferable from one produce merchant to another except by consent of the Rationing Office.

The rates for all priority crops will be the same as in 1943-44, and supplies of blood and bone will be restricted to potatoes and vegetable crops. Applicants for these priority crops will render considerable assistance if they confine their claims for plantings to the current quarter in operation. The priority quarters conclude at the 30th September, 31st December, 31st March, and 30th June.

In some cases growers will be planting early in the commencement of the following quarter and in order to assist them to obtain supplies of fertiliser in time, it is permissible to lodge an application for the next quarter as from the commencement of the last month of the preceding quarter, e.g., applications for early plantings in October may be lodged as from the 1st September.

The Fertiliser Rationing Office feels that the new system which has been introduced for the rationing of non-priority crop fertilisers will facilitate considerably the release of quotas for the 1944-45 season, and will do much to ensure the timely despatch of orders. The ultimate success of the scheme can only be achieved by the complete co-operation of applicants, distributors, and the Rationing Office of the Department of Agriculture.

The Mediterranean Fruit Fly.

C. F. H. JENKINS, Government Entomologist.

The Mediterranean Fruit Fly is without doubt the most serious insect pest with which Western Australian orchardists have to contend. The creature has been known to science for nearly 120 years, and in that time has spread to almost every important fruitgrowing country in the world.

DISTRIBUTION.

Although the term "Mediterranean" would suggest a Southern European origin for the insect, known facts concerning its artificial distribution show that the ancestral home is probably the jungles of West Africa.

The spread of this fly is just another example of how the balance of nature may be upset by the interference of man. In this case by the transportation of fly-infested fruits to clean countries, many of which unfortunately were admirably suited to the survival and multiplication of the pest.

In this State the insect is known as far north as Carnarvon, where it was first found in 1934. But the permanent home of the pest may be regarded as that area of the State westward of a line running from Gingin south-eastwards to include Northam and York, and thence southwards to Balingup and Busselton. Casual outbreaks have occurred at Bridgetown, Albany, Mount Barker, Kalgoorlie, Sandstone, and other outlying localities where it has failed to become established.

Mediterranean Fruit Fly (greatly enlarged). 1, Female; 2, Male (note tiny club-like appendages on head of male.

[After Silvestri.]

In the case of the southern fruit-growing areas, failure is due to the stringent control measures adopted and the relatively unfavourable climatic conditions, whereas in the other districts the scarcity and lack of continuity of suitable host plants accounts for its spasmodic appearances.

There are some orchardists who doubt whether the fruit fly could ever survive the cold winter of our lower South-West, but such sceptics should mark that in 1901 apricots were first damaged near Paris, and that since then outbreaks have recurred with increasing frequency and severity, until losses of 50 per cent. recorded in 1933 left little room for doubt that a permanent focus of infection had been established, despite the uncongenial winters experienced in those latitudes.

118 larvae of Mediterranean Fruit Fly taken from a single orange.
[After Quayle.]

DESCRIPTION.

At this stage it may be well to describe just what the fruit fly looks like, for despite the damage done it is surprising the diversity of opinion held even amongst fruit growers as to just which of the many flies seen about the orchard is the fruit fly.

The Mediterranean Fruit Fly is a two-winged insect, a little smaller than the house fly. The general colour is yellowish or light brown. The wings bear brownish bands and spots, and the abdomen has two light-coloured rings. The pattern on the thorax or back consists of irregular white markings on a black ground, giving a mosaic appearance. In the sunlight this pattern often shows a metallic sheen. The wings are normally held in a drooping and what appears to be a semi-spread position, and are never folded flat on the back as in the case of the house fly.

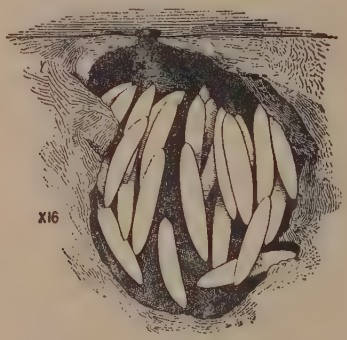
There are a number of common flies confused with the fruit fly. One is a dark, clear-winged fly, which may be seen haunting fruit trees, and constantly

spreading and closing its wings. This insect, although closely related to the fruit fly, is not of economic importance. Another species often impugned is the so-called ferment or vinegar fly. It is much smaller than the fruit fly, yellowish in colour, and without the prominent yellow markings on the wings. This fly is often caught in large numbers in fruit-fly traps, and may be found swarming in countless numbers around decaying fruit. As the name ferment fly implies, however, it is essentially a lover of decomposing or fermenting material, and will not injure sound fruit.

LIFE HISTORY.

Now for some details of how the fly lives and how the damage to fruit is caused. The female fruit fly seldom strays far from the protecting foliage of fruit trees, and when suitable hosts are available a puncture is made in the skin and six to eight eggs are deposited in the cavity made.

Here may be corrected an erroneous idea held by many, that the fly lays her eggs into the blossoms. This is definitely not so, as the eggs are laid only into the fruit and, what is more, only into the fruit which is well on the way to ripening.



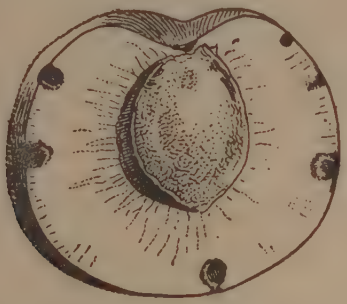
Cross-section of peach (greatly enlarged showing the general shrivelling of the walls of the egg cavity and separation of the eggs.
[From U.S. Dept., Agric.]

The eggs hatch in summer in from two to four days. In winter, however, the time required may be as long as twenty days. The tiny maggots upon hatching immediately commence feeding and burrowing into the fruit. This activity causes the tissues to break down, soft spots to form, and finally perhaps the complete decomposition of the fruit. The maggot when full grown is about one-third of an inch in length, and creamy white in colour. In fact, it resembles very much in general appearance a house fly or an under-sized blowfly maggot.

When fully developed, the maggot leaves the fruit, drops to the ground, if the fruit has not already fallen, and burrows into the soil. The time spent in the fruit will vary according to the weather conditions and the type of fruit, but the period in summer is about 14 days, and in winter sometimes as long as 45 days. One interesting feature about the fruit fly maggot is its ability to jump. When placed on a dry surface it can, by sudden muscular action, skip to a distance of a foot or more. This is not, however, a characteristic of the fruit fly maggot alone, for various fly larvae possess this agility, including "cheese jumpers" and the maggots of the tomato fly.

As soon as it burrows into the ground the maggot changes into a rounded barrel-shaped pupa, looking not unlike a rather dark swollen grain of wheat. The pupal or resting stage varies from 12 to 50 days according to the time of the year, after which the fully developed fly emerges and forces its way up to the surface of the ground.

These new flies are not immediately capable of injuring fruit for they must first meet a mate and then wait a week or more before depositing eggs. It is at this time that the flies can be successfully attacked, for like house flies these insects are fond of sweet liquids. They are unable to live longer than about four days without food, and consequently if baiting were regularly carried out by all growers it would be possible to poison off the flies before they reached the egg-laying stage.



Small apricot showing fruit fly eggs deposited in five places.
[From U.S. Dept. Agric.]

HOST PLANTS.

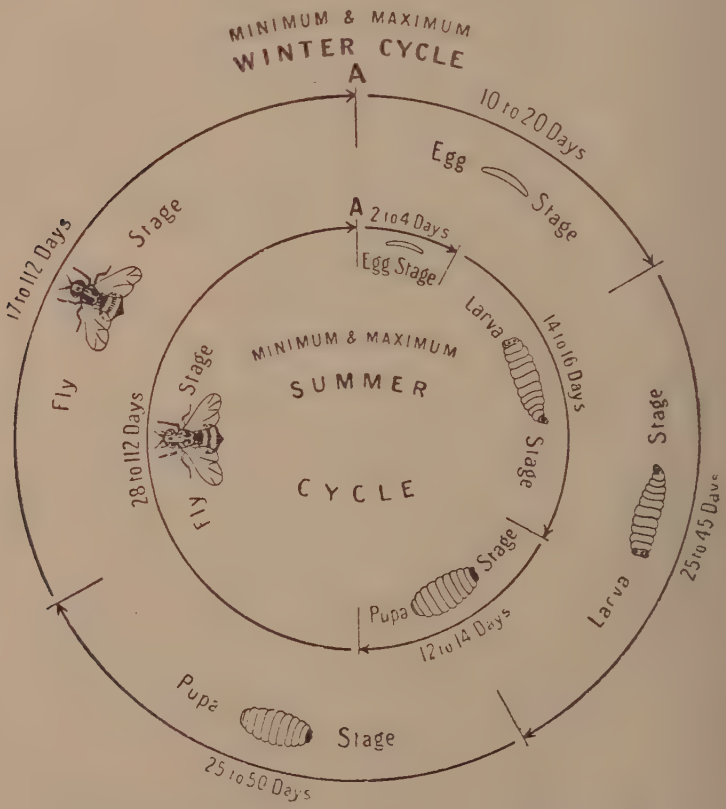
Well over 100 fruits, nuts and vegetables have been recorded as hosts for the fly in different parts of the world. Many of these records have, however, been secured under artificial conditions, and certain hosts are definitely more susceptible to attack than others.

In Western Australia the fly has been found attacking peaches, figs, apricots, pears, all citrus fruits, nectarines, apples, grapes, plums, persimmons, quinces, loquats, plantains, and passion fruits. Such ornamentals as the pomegranate, clerodendron, lillypilly, chilli, rose, Irish strawberry, Barbados gooseberry, prickly pear, Osage orange and Natal plum are also known hosts, and to complete the list must be added the following weeds: African box thorn, Apple of Sodom, and black-berried nightshade.

An examination of this list will show that not a single native plant is included. The importance of this cannot be too fully emphasised, for it means that with the exception of relatively unimportant weeds, all the hosts of the fruit fly in Western Australia are cultivated plants. This simplifies, or should simplify, the problem of control very considerably. It means that if all growers were fully alive to their responsibilities the fruit-fly menace could be, if not eradicated, so reduced as to be of little importance. In countries where native fruits harbour the pest the task is very different. There every care may be taken in the orchard only to be nullified by an invasion from bush or jungle, but in Western Australia a man can only blame either himself of his neighbour (of course it is usually the latter) for the presence of fruit fly in his orchard.

CONTROL.

For many years trapping by means of lures such as pollard and borax solutions, "Clensel" and "Beeco," in glass jars and tins was widely advocated. There is no doubt as to the effectiveness of this method if intensively carried out, but more recent investigations have shown foliage baiting to be very efficient, and to have the additional advantages of ease and speed of application, especially where large areas need treatment. Just as the housefly is attracted to the jam dish and the sugar basin, so the fruit fly is partial to sweetened solutions. Certain poisons are more toxic to the fly than others, and sodium fluosilicate has given the best results of those tried locally.



The life-cycle of the Mediterranean Fruit Fly in Western Australia.
[After Newman.]

The formula at present recommended against the fly consists of ingredients in the following proportions:

Bait Formula.

Sodium fluosilicate	1 ounce
White sugar	2½ lbs.
Water	4 gallons

Such a quantity is, of course, more than a backyard grower would need at any one time, and to simplify the measurement of small quantities, units such as tablespoons and cups have been adopted.

To make a stock solution of bait for keeping, put one dessertspoonful of sodium fluosilicate in a pint of water. When mixing bait for use shake up the bottle of stock and add three tablespoons of this solution to one pint of water in which has been dissolved three tablespoonfuls of sugar.

Quantity of Bait Required.

Although the amount of bait required for a number of trees will vary according to their size, as a rough guide, one gallon of spray may be regarded as sufficient for 40 fruit trees, or 100 grapevines. Where a few backyard trees are under consideration, from half to a cup of bait each should be adequate.

How to Apply Bait.

In a large orchard or vineyard the use of some type of spray pump will usually be found the most convenient way of applying the spray. Where such expensive equipment is not warranted, however, the bait can be splashed on to the foliage by means of a whitewash brush, perforated tin, or other improvised method.

The quantity of bait per tree should be carefully noted. There are still some people who spray the whole of their trees when baiting, thinking they are fulfilling requirements. Such a practice is unnecessarily expensive, and extravagant of material, and if persisted with possibly even detrimental to the trees. The object should be to have a quantity of sticky bait here and there on two or more sides of the tree, avoiding the fruit as much as possible, so that wandering flies will have a good opportunity of feeding.

When to Apply Bait.

The maximum period between treatments should be six days, but of course if heavy rain washes the bait off before this time has elapsed, a second treatment should be given. As the fruit fly frequently attacks fruit before it is dead ripe, baiting should be commenced at least six weeks before the crop is ready to pick, and continued right through the season for a couple of weeks after the trees have been stripped, just to make sure that any straggling flies are not allowed to escape.

In addition to the home-made bait there are certain proprietary mixtures available which comply with departmental recommendations.

Warning.

In mixing and applying any of the formulae the quantities stated should be rigidly adhered to, reducing the chance of any possible injury to the foliage or harmful deposits of poison on the fruit. These are sold under the names of "Lurotox" and 109.

Orchard Sanitation.

Although foliage baiting is an important factor in fruit fly control, it can only hope to be really effective when carried out in conjunction with strict orchard sanitation. Infested fruit should never be allowed to lie on the ground, and should be disposed of by boiling or burning. Burying is not recommended, and when the life history of the pest is recalled the reason will be clear. The maggot naturally burrows into the soil to pupate, so that by burying maggoty fruit the

fly's normal development is only being assisted. Certainly, if the fruit is buried deeply enough no insects can emerge, but when it is remembered that fruit flies have successfully pushed their way through four feet of dry sand the weakness of this method is obvious.

Grapefruit injured by fruit fly maggots.
[From U.S. Dept. Agric.]

Cutting Back Trees.

In order to simplify the work of sanitation, growers—and this especially applies to backyard growers—are advised not to let their trees grow to such proportions that the fruit cannot be easily reached. Special attention should be paid to fig trees and loquats, for often these are neglected and allowed to carry far more fruit than can possibly be used. It is better to cut such trees back to a height of say, 10 feet, so that they can be easily baited and so that the fruit can be conveniently picked rather than allowed to grow unclipped and be a menace to neighbours and perhaps to the owner if the Fruit Fly inspector calls.

Every grower should aim at getting good clean fruit from his trees, and if this cannot be realised he will be doing a public service by removing them.

The Utilisation of Cereals in Western Australia.

I. THOMAS, Superintendent of Wheat Farming.
A. J. MILLINGTON, Plant Geneticist.
H. G. CARISS, Agricultural Adviser.

The agricultural development of Western Australia has been concerned in the main with the cultivation of Mediterranean crops. By virtue of climatic conditions, consideration of this development concerns only the south-west portion of the State comprising only 5-8 per cent. of the total area. The rainfall of this portion of the State is confined chiefly to the cooler months and favours the winter and spring grown cereals, grasses and legumes. In the development of West Australian agriculture, the cultivation of cereals has been of prime importance since the first days of colonisation, though prior to the beginning of the present century, the development of pastoral pursuits was more marked than the former (Battye "History of Western Australia" p. 138).

Of the cereals, wheat as a basic foodstuff naturally attracted early attention and has been the major agricultural crop ever since. Self-sufficiency in wheat was attained by 1890, but the rapid development of the gold industry with

resultant considerable increase in population necessitated the importation of wheat. During the depression that followed the decline of the gold industry in the early part of the century, the first great expansion in agriculture occurred. The policy of the Government which came into power in 1905 was to bring together the idle land and idle men and to employ the credit of the State to finance their operations up to the stage of production. Following the carrying out of this policy, the industry with the exception of a minor recession during World War I. expanded rapidly to a peak period in 1930. (Roberts, 1936, and Millington, 1943.)

During the early years of settlement, wheat was the principal crop both for grain and hay, very small quantities of the other cereals being grown. Through farm development and greater diversification of agricultural practices, the areas sown to oats and later barley, increased considerably. The rapid increase in sheep numbers in the wheat growing areas has been a contributing factor in the increase in the areas sown to the cereals other than wheat. Oats have shown the greatest expansion with a smaller increase for barley.

Although only grown to a very small extent, rye could be used more extensively on the poorer soil types, such as "Wodgil," where the other cereals are unsatisfactory. Rye is the best cereal for controlling soil drift.

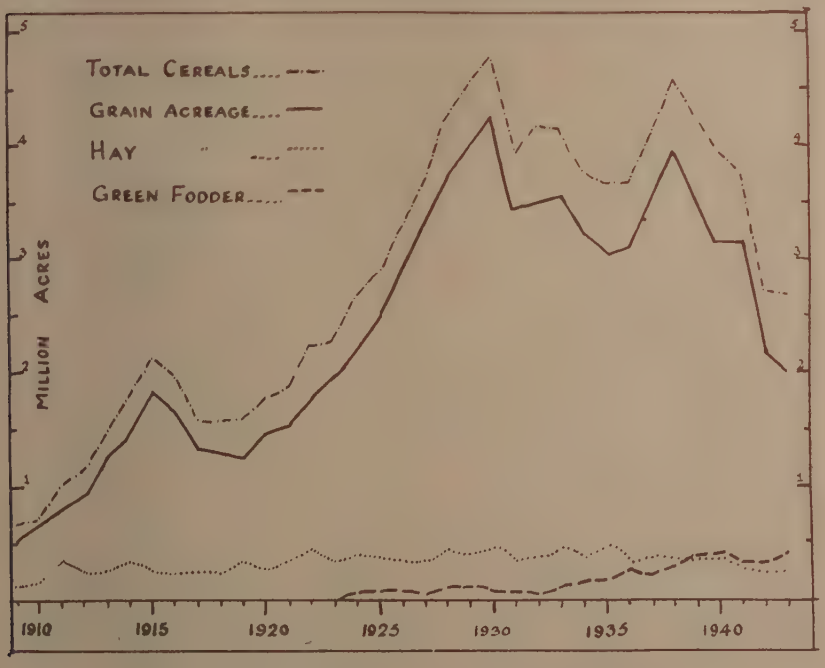


Fig. 1.—Cereal Utilisation in Western Australia, 1909-1943.

CEREAL UTILISATION.

The relative utilisation, for grain, hay or green grazing, of the three cereals under discussion is illustrated in the accompanying series of graphs, figs. 1-6. Individual details are tabulated in the appendix, Table A.

Cereal Plantings.

In figure 1 the total plantings for all purposes are shown together with the individual total areas sown for grain, hay and green fodder. It will be noted

that the fluctuation in the areas sown to grain is apparently responsible for the variation in the total area sown for all purposes. The area sown to hay has remained comparatively steady but that for green fodder has risen fairly rapidly over the past 10 years and is now greater than the area for hay.

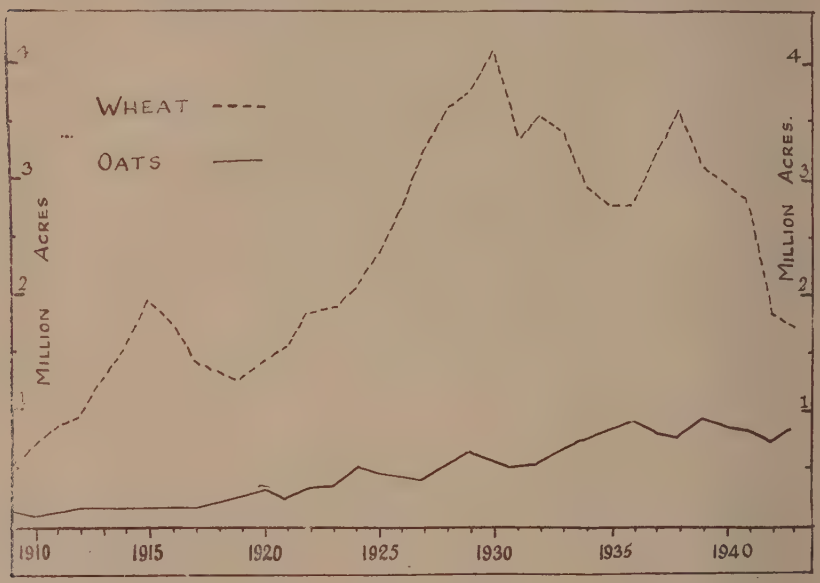


Fig. 2.—Total Plantings of Wheat and Oats in Western Australia, 1909-1943.

Wheat and Oat Acreages.

From figure 2, it will be noted that whereas the area to oats has risen steadily throughout, that for wheat has tended to decline since 1930. The marked increase in oat cultivation is evident from figures 3, 4 and 5.

The area sown to barley is included in figure 1 but not in figure 2 owing to the small area planted, compared with that to wheat and oats.

Wheat and Oats for Grain.

Figure 3 illustrates the fluctuation in wheat acreages particularly during the period following the peak year of 1930. The fall in the wheat area immediately after 1930 was due to low prices, adverse seasons and later the recession of the marginal areas from wheat growing. The sharp reduction to 1942 and 1943, is due to compulsory reduction under the Wheat Stabilisation Scheme, manpower and fertiliser shortages.

Cereal Hay.

The predominance of the wheat crop in the earlier years of settlement is apparent from figure 4. However, since 1930, with the exception of two seasons, the areas cut for hay from both wheat and oats have been rather similar with oats tending to predominate.

The greater area of oaten hay is possibly due to the general rise in cultivation of this cereal combined with the increase in stock numbers. Barley for hay

is of negligible consequence. It is notable that the production of cereal hay at the present time is somewhat on a par with 30 years ago. At that time, the demand for chaff was considerably greater than it is now. Consumption on the farm for horse feed is much less due to greater mechanisation. Hay production could be increased to advantage to raise and maintain the stock carrying capacity of farms. That more is not now cut is due in part to the high labour requirement of this crop.

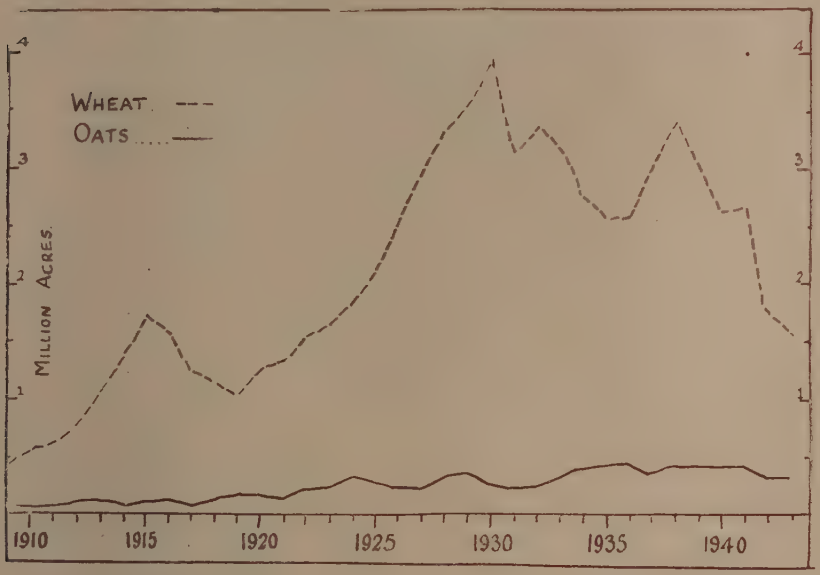


Fig 3.—Plantings of Wheat and Oats for Grain in Western Australia, 1909-1943.

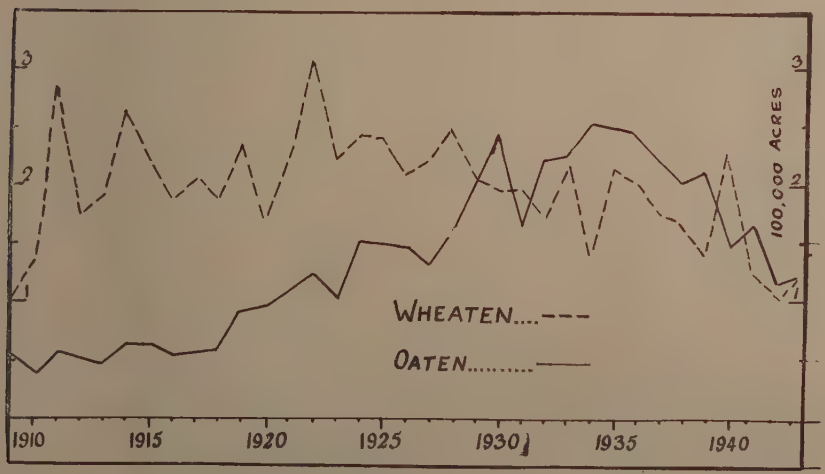


Fig. 4.—Areas Sown for Cereal Hay in Western Australia, 1909-1943.

Green Cereal Fodder.

The substantial increase in the area sown for green fodder purposes, illustrated in both figures 1 and 5 is due to the greater diversification of agriculture. In the dairying and similar high rainfall districts, the cereals are cultivated mainly for hay and green fodder, only a small proportion being harvested for grain and this for stock feed purposes only.

Barley.

Of the three cereals, barley is the least cultivated and as will be seen from figure 6, it is grown chiefly for malting purposes. The expansion of the export trade between 1935-39 was in suitable samples of six-row malting types, and the subsequent decline is due to the cessation of these exports under war conditions. Six-row types are used to a negligible extent by local maltsters. Since 1935 the area sown to green fodder has risen sharply, the slight decline since 1940 being due, as with the other cereals, to manpower and fertiliser shortages rather than to its being superseded by another cereal. Barley is eminently suitable for green fodder purposes.

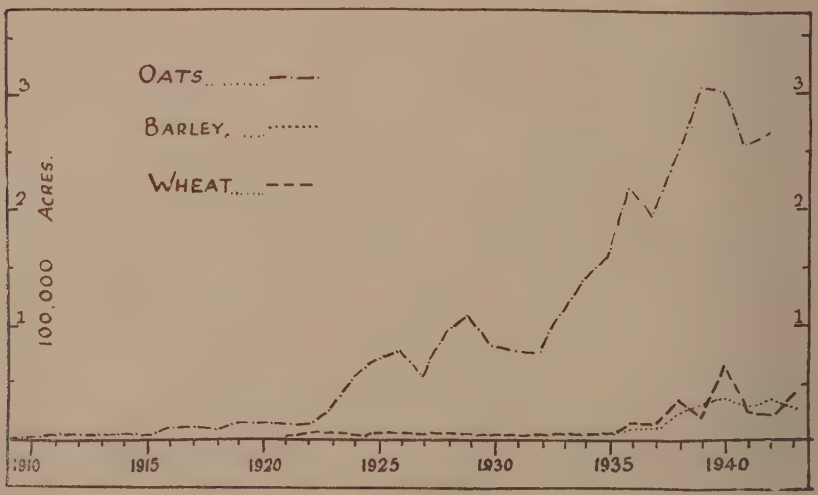


Fig. 5.—Plantings of Cereals for Fodder in Western Australia, 1909-1943.

PURE SEED PRODUCTION.

The expansion in the area sown to cereals created a demand for supplies of grain suitable for seed purposes according to the requirements of the different districts and the purpose for which the crop was required.

The production and distribution of pure seed has been a function of the Department of Agriculture since the inception of the first Agricultural Research Stations at Nabawa and Merredin, some 40 years ago. In both instances they were primarily established to demonstrate that wheat could be grown in the district thereby assisting land sales and settlement. They served as guides to early settlers, many of whom had had little previous farming experience, and their crops provided relatively pure seed for farmers.

Development of Varieties for Western Australian Conditions.

The systematic introduction and production of wheat varieties suited to West Australian conditions, dates from 1895, when the late G. F. Berthoud established

the Hamel State Farm near Waroona. Berthoud had engaged in experimental plant breeding prior to his migrating from Victoria to Western Australia. Whilst conducting these experiments, he contacted Farrer, whose methods he followed in his breeding work. Although the Waroona district was quite unsuited to wheat growing, Berthoud continued to breed new varieties and to introduce Farrer wheats until about 1908. He appreciated, as did Farrer and other breeders, that the extension of the wheat industry into the lower rainfall districts of any State could only be on the basis of earlier maturing varieties which complete their growth cycle in the shorter growing period available in those areas. Berthoud recommended several of the earlier maturing Farrer wheats for cultivation in the new districts which were being opened up and in Alpha he bred a useful early maturing variety. The introduction of Burt's Early oats from America was made by Berthoud.

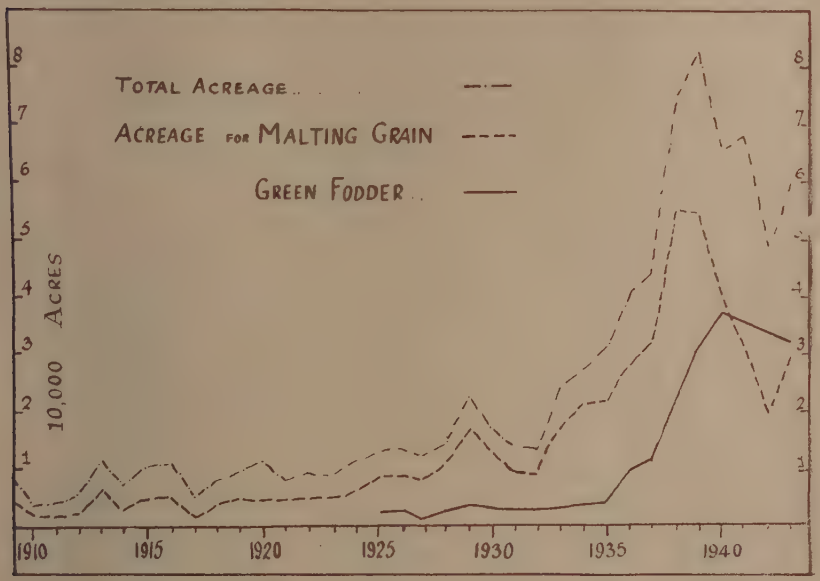


Fig. 6.—Plantings of Barley in Western Australia, 1909-1943.

The functions of the Agricultural Research Stations are today much the same as they were when defined by Mr. (now Dr.) G. L. Sutton upon his appointment in 1911 as Commissioner for the wheat belt. They were defined by him (Sutton 1912) as—

"(i) To conduct reliable and systematic experiments and investigation, having special reference to the requirements of Western Australian conditions.

(ii) The production in commercial quantities of pure seed wheat of the standard varieties, for sale to farmers, so that they can obtain clean fresh stocks of seed, raised on up-to-date lines and improved as the result of selection.

(iii) The production, by crossbreeding, of new and improved varieties of wheat specially suitable for the various climatic and soil conditions of the different districts of Western Australia."

Both oats and barley were later included in the programme.

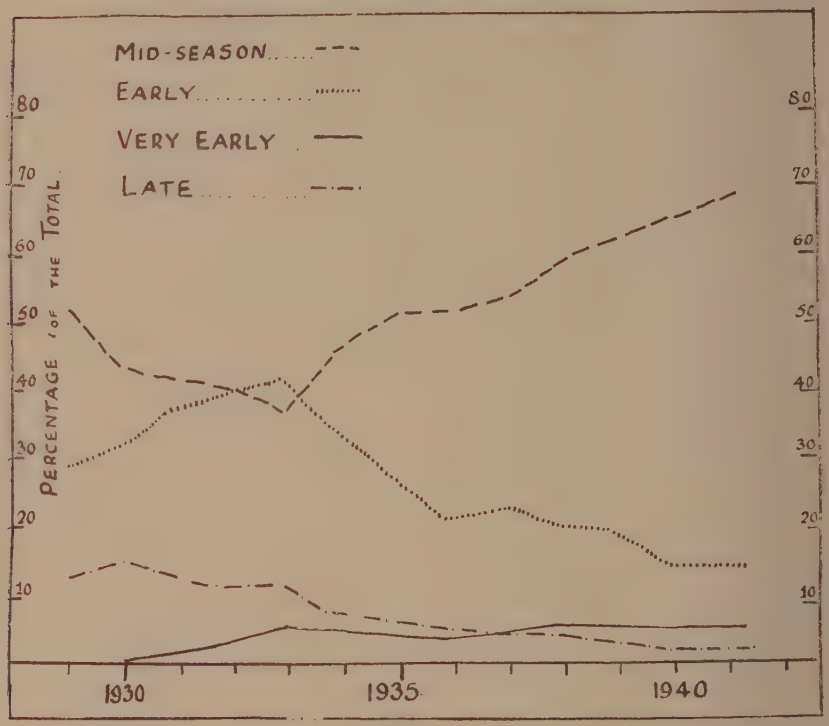


Fig. 7.—Plantings of Wheat in Western Australia grouped according to maturity 1929-1941.

Maintenance of Varietal Purity:

Dr. Sutton introduced the pedigree system of seed production whereby a pure line of each variety is maintained. Surplus seed from the pure line is used each year as the foundation stock for Research Station plantings and when sufficiently increased is made available for farmers as "graded, pedigree seed." The care with which the various stages in the production of this seed is carried out and its fundamentally correct scientific basis, results in farmers receiving varieties which are better than 99.99 per cent. pure. The term "variety" achieved a new significance as a result of the distribution of pedigree seed and crops sown with such are markedly more uniform.

As a result of this policy, the varieties of wheat which the Department of Agriculture now recommends are a considerable improvement over other and older varieties, particularly with respect to one or more of such factors as yield, straw strength, disease resistance and flour strength.

Importance of Period of Maturity.

A knowledge of the maturity of the variety to be sown is desirable since as the planting season advances the available growing season is correspondingly shortened. A variety which utilises efficiently the whole of the available growing season will naturally be at an advantage in respect to yield over varieties which mature either earlier or later.

Choice of Varieties for Cultivation.

When considering the varieties to be used on any farm, the main points are -

(a) Rainfall and length of growing period.
(b) Specific purpose required, *i.e.*, for grain, hay or green feed.
(c) Liability of district to diseases such as rust.

It is desirable that the number of varieties of each cereal be restricted, as too many generally lead to admixture. With the greater diversification of the agriculture of the wheat belt over the past 10 years or so, the growing of cereals for fodder purposes has increased the number of varieties to be handled each year and the liability of admixture occurring. A minimum number of varieties is desirable but some farmers are known to carry more than a dozen. For Zones 2 and 3 (see below) a desirable maximum of eight to ten would consist of three or four varieties of wheat, three or four of oats and two of barley. With Zone 1 and the drier districts in particular, a restriction to two maturities for both wheat and oats and one barley variety is often practised.

For convenience the wheatgrowing areas can be divided into three zones based on the annual rainfall. The roads boards included in each zone are -

Zone 1 Under 14 inch.	Zone 2 14-18 inch.	Zone 3 18-20 inch and above.
Mullewa	Northampton	Greenough
Morawa	Upper Chapman	Irwin
Perenjori	Geraldton	Moora
Dalwallinu	Mingenew	Victoria Plains
Dowerin	Three Springs	Toodyay
Wyalkatchem	Carnamah	York
Koorda	Wongan-Ballidu	Brookton
Mt. Marshall	Goomalling	Cuballing
Mukinbudin	Northam	Narrogin
Westonia	Meckering	Wagin
Nungarin	Corrigin	Katanning
Merredin	Kulin	Broomehill
Kellerberrin	Quairading	Tambellup
Kununoppin	Wickepin	Woodanilling
Bruce Rock	Dumbleyung	Esperance
Narembeen	Kent	(Southern 1/3)
Kondinin	Beverley	
Lake Grace	Pingelly	
Yilgarn	Gnowangerup	
Dundas		
Esperance		
(Northern 2/3)		

The maturity of the chosen varieties will determine the quantity of each required for seed purposes. Usually the main variety is of mid-season maturity, but the proportion sown to each group will vary somewhat with the season. It is desirable to have on hand a reserve of early and very early maturing varieties for sowing when planting is delayed by seasonal conditions. Best results are usually obtained when each variety is planted at the correct time for its maturity. May is the best month for planting and, circumstances permitting, the whole programme should be completed within that period. Formerly, seeding commenced in mid-April, but very little is now carried out prior to May as the land is tending

to be weedier. Rather than commence early and have weedy crops the tendency is to extend the planting period into June, using early to very early maturing varieties.

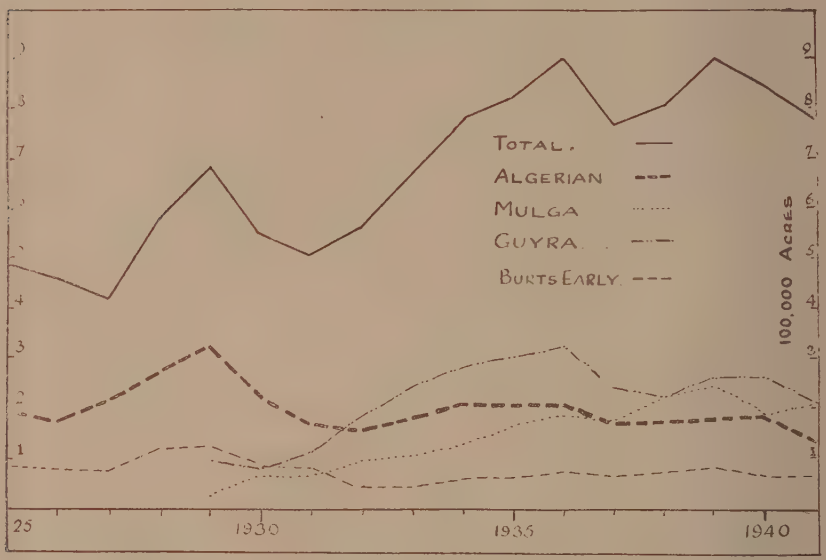
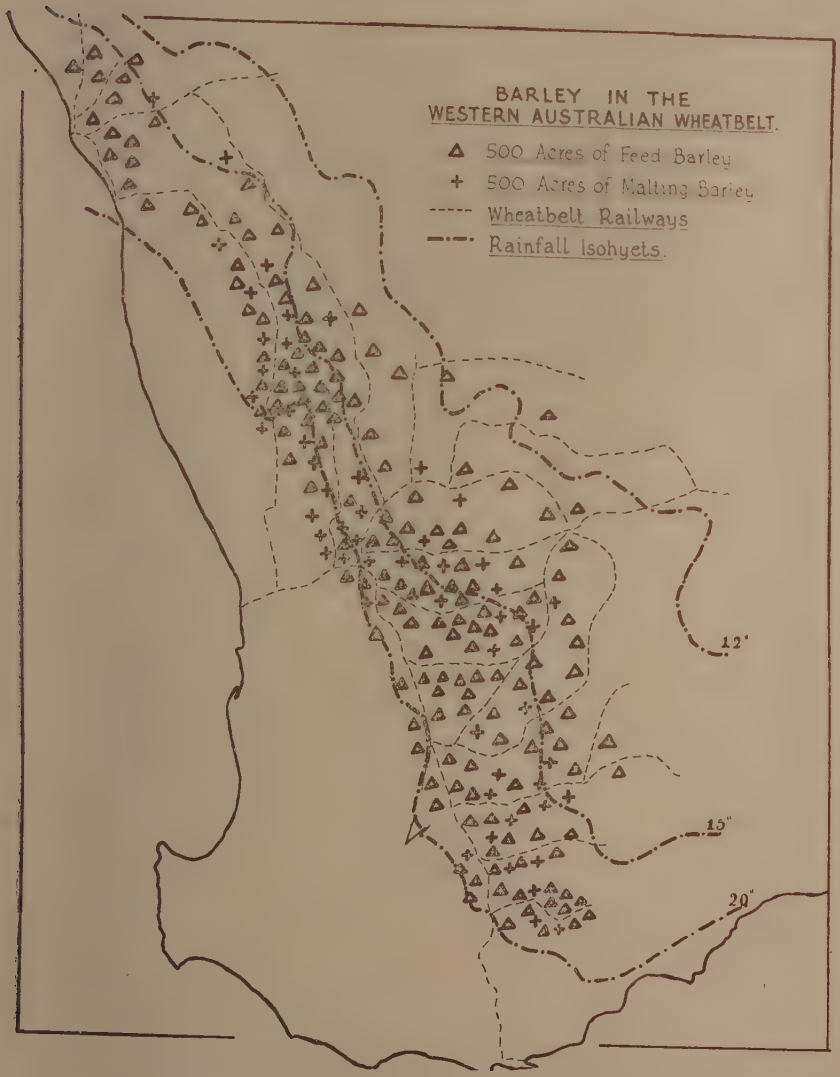


Fig. 8.—Plantings of Oats in Western Australia, 1925-1941.

The following table has been compiled from collected statistical data and gives the proportionate planting for each maturity in each zone. Their distribution is shown in the accompanying maps.

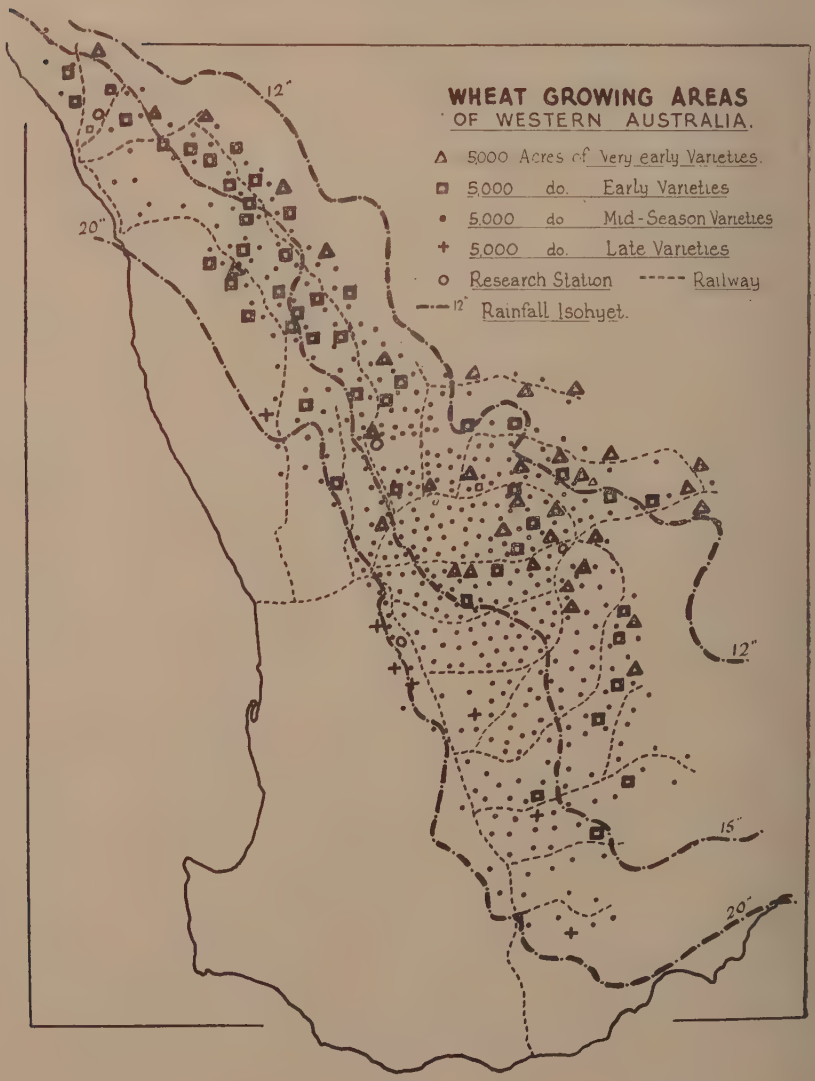
Cereal.	Zone 1. Early. Under 14 in. Rainfall. Chiefly Wheat.		Zone 2. Midseason. 14 in. to 18 in. Rainfall. Wheat and Sheep.		Zone 3. Late. 18 in. to 20 in. Rainfall. Sheep and Wheat.	
	Proportion.	Maturity.	Proportion.	Maturity.	Proportion.	Maturity.
Wheat	2/3	Midseason ...	4/5	Late and midseason	9/10	Late and midseason
	1/3	Early and very early	1/5	Early and very early	1/10	Early and very early
Oats	1/3	Midseason ...	2/3	Late and midseason	3/4	Late and midseason
	2/3	Early and very early	1/3	Early and very early	1/4	Early and very early
Barley	...	Early (fodder)	...	Early (malting), Early (fodder)	...	Early (malting), Early (fodder)

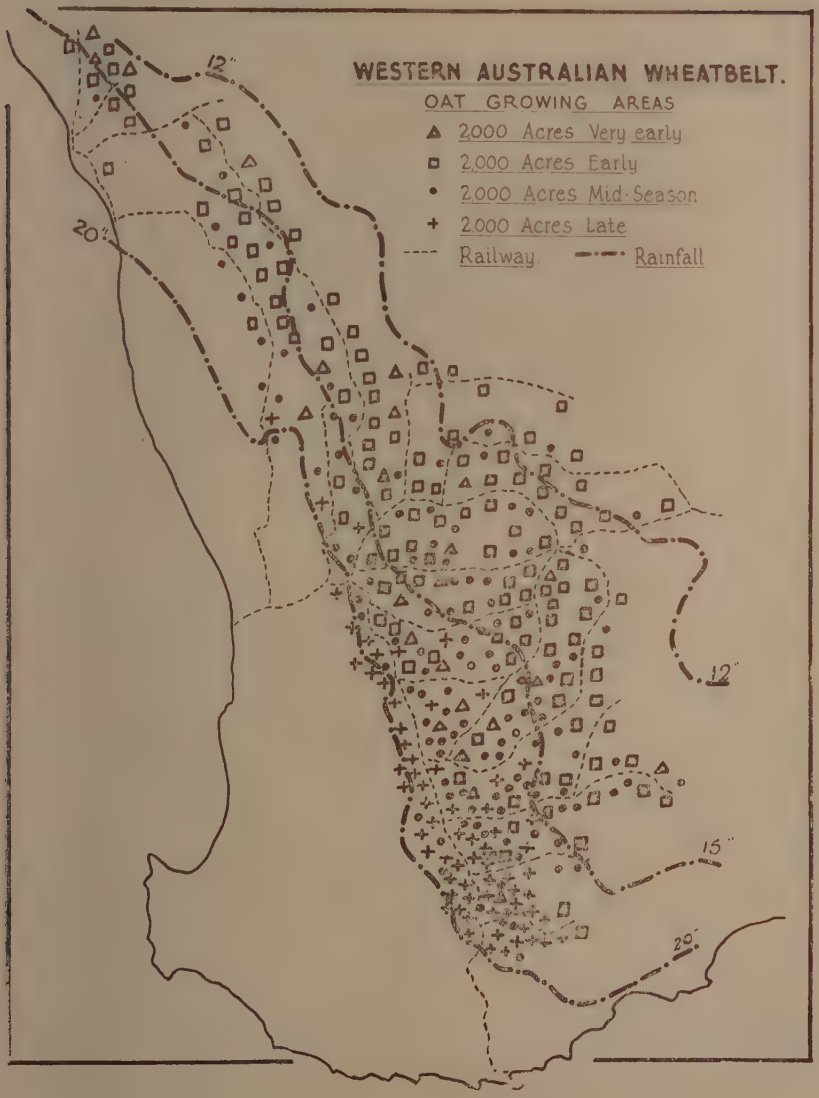


Recommended Cereal Varieties.

The following is a table of the varieties now recommended by the Department of Agriculture as a result of the experimental and selection work at the Agricultural Research Stations and elsewhere. The factors in which improvement has been effected are yield, straw strength, disease resistance and quality in the sense of suitability for their particular purpose.

	Zone 1.	Zone 2.	Zone 3.
Wheat ...	Kondut (midseason) Bencubbin (midseason) Koorda (early) Bungulla (very early)	Kondut (midseason) Bencubbin (midseason) Koorda (early) Bungulla (very early)	Sutton (late) Kondut (midseason) Bencubbin (midseason) Koorda (early) Bungulla (very early)
Oats	Dale (late midseason) Guyra (midseason) Ballidu (early) Wongan (very early)	Algerian (late) Fulghum (grazing only) Guyra (midseason) Dale (midseason) Ballidu (early) Wongan (very early)	Algerian (late) Fulghum (grazing only) Guyra (midseason) Dale (midseason) Ballidu (early) Wongan (very early)
Barley ...	Atlas (early)	Atlas (fodder) Prior (malting early)	Atlas (fodder) Prior (malting)





WHEAT VARIETIES.

Standards of Maturity.

It is customary in Western Australia to classify wheat varieties into four standard maturity groups relative to the control variety, Gluyas Early:—

(i) Very early maturing—flowering five or more days earlier than Gluyas Early.

(ii) Early maturing—flowering four days earlier to three days later than Gluyas Early.

(iii) Midseason maturing—flowering four to nine days later than Gluyas Early.

(iv) Late and late midseason—flowering ten or more days later than Gluyas Early.

The Importance of the Correct Planting Time.

The relationship between time of planting, variety and yield is shown by the following table:—

Variety.	Maturity.	Annual Planting Date.	No. of Years.	Yield as a percentage of Nabawa (mid-season maturing control.)	Research Station.
Bungulla ...	Very early ...	May 15th ...	3	115	Merredin
		June 15th ...	3	131	do.
Sutton	Late ...	April 15th ...	9	108	Wongan Hills
		May 15th ...	7	97	do.

To obtain maximum yields it is desirable that the seeding programme each season should commence with the latest maturing variety which it is intended to sow and as the planting season advances, quicker maturing types should be planted.

A considerable number of crops were destroyed by the disease septoria until it was appreciated that it was caused by the early planting of early maturing varieties. It was the practice at one time at the Chapman Research Station to plant all varieties in the variety trial at the same time, which was usually early May. Under these conditions, Geeralying, an early maturing variety, frequently suffered major damage from septoria. In 1920 the planting of this trial was delayed until late May. In that season Geeralying was not affected by septoria and it became evident, from this and later observations, that the disease could be controlled by planting varieties according to their maturity. Crops which head out too early are also very susceptible to frost injury which may destroy the floral organs and prevent grain formation.

Statistical returns showing the areas sown to the different wheat varieties are available for Gluyas Early and Nabawa for 1925 and 1926 and from 1927 to 1941 for a larger number of varieties. It will be seen from figure 7 that the area sown to the late maturing varieties has declined to a negligible acreage and that the proportions sown to early and midseason types have changed markedly in the last decade. In 1931 the midseason varieties were sown over 41 per cent. of the wheat belt whilst in 1941 they occupied 68 per cent. During the same period the early varieties declined from 37 per cent. to 14 per cent. of the total wheat acreage. The ascendency of the midseason varieties is probably due to a number of factors including (1) the reduction in wheat acreages which, with increasing mechanisation, enables farmers to complete their planting during the optimum planting month which is May for most districts, (2) the recession of much of the low rainfall marginal country from wheat growing resulting in an increased percentage of the State's wheat being grown on relatively light land in the medium rainfall districts. On these soils the early maturing varieties are apt to be weak strawed.

Since the commencement of plant breeding work at the Wongan Hills Research Station in 1933 it has been possible to select for the lighter soil types. The varieties Koorda (early maturing) and Kondut (midseason) are the direct outcome of this policy. Both are eminently strong strawed.

As mentioned earlier it is very desirable that sufficient seed of both early and midseason varieties be kept on hand in order that areas sown to each can be adjusted to the season. The following table has been drawn up to cover the planting period extending from mid-April to mid-June.

Annual Rainfall.	April.	May.		June.	
	3rd–4th Week.	1st–2nd Week.	3rd–4th Week.	1st Week.	2nd Week.
Below 14 in. ...	Kondut Baroota Wonder (Hay)	Kondut Bencubbin Comeback*	Koorda Pusa IV.* Bungulla	Bungulla	
14 in.–18 in. ...	Kondut Baroota Wonder (Hay)	Baroota Wonder (Hay) Kondut Bencubbin Nabawa Ford	Koorda Merredin Comeback* Pusa IV.*	Bungulla	Bungulla
Over 18 in. ...	Kondut Baroota Wonder (Hay)	Baroota Wonder (Hay) Kondut Nabawa Ford	Bencubbin Kondut Nabawa	Koorda Pusa IV.*	Bungulla

*Premium varieties.

The following are short descriptions of the recommended varieties:—

Midseason Varieties.

Kondut.—Bred at the Wongan Hills Light Lands Research Station, Kondut has yielded well, over a wide range of soil and climatic conditions.

Although not rust resistant, it gives better yields under epidemic conditions than Bencubbin and Nabawa. It is resistant to flag smut.

The straw is stout and the variety can be recommended for early planting particularly on light land and in rust liable districts.

Kondut yields flour which is usually superior in strength to that of the f.a.q.

Eureka II.—This variety was bred in New South Wales as a resistant wheat for planting in rust liable districts. A new rust strain has, however, appeared in New South Wales to which Eureka is susceptible. This race has not yet been collected in Western Australia.

Eureka II. is a stout strawed rather tall growing brown chaffed variety with translucent grain. Under slow ripening conditions the grain frequently mottles. The flour strength of Eureka is well above the f.a.q. of the State. It is resistant to flag smut. The desirable planting date for Eureka II. in each district would be about the same as for Bencubbin.

Bencubbin.—This is the most extensively grown variety in Western Australia and also Australia. The straw strength tends to be weak on light land but is satisfactory for hay. Bencubbin is notable for its high yields under inferior

seasonal conditions, and although very susceptible to rust is resistant to flag smut. Its flour strength is equal to the State f.a.q.

Nabawa.—The lower yields of this variety have resulted in its being largely replaced by Bencubbin, which it resembles in general characteristics except that it is stronger strawed and perhaps a trifle less susceptible to rust. It is resistant to flag smut. The flour strength of Nabawa is slightly superior to that of the State f.a.q.

Ford.—A tall growing variety which possesses a useful resistance to rust and flag smut. Ford is valued chiefly as a hay variety in the better rainfall districts. When harvested as grain its flour strength is superior to that of the State f.a.q.

Early Maturing.

Koorda.—A relatively recent release by the West Australian Department of Agriculture, Koorda, has yielded well on the lighter soils where its strong straw is of great value. Koorda is practically immune to flag smut and tends to be rust escaping in all but the heaviest epidemics. The flour strength of Koorda is about the same as that of the f.a.q. standard.

In yield trials on the Research Stations, Koorda has outyielded Merredin, a variety which it has been designed to replace.

Merredin.—This variety is popular in the Northern districts of the State and yields well under favourable conditions. It is susceptible to flag smut and to rust, although because of its early maturity, it usually escapes major damage. The straw frequently tends to be weak, but the flour strength is generally superior to the State f.a.q. wheat.

Very Early Maturing.

Bungulla.—Variety trials are conducted at all five wheatbelt research stations and at three of these Bungulla is, on the average, the most prolific wheat under test.

Because of its early maturity, it usually suffers relatively little rust damage. The straw strength is satisfactory on the heavier soil types, but Koorda is to be preferred on light soils in all but the drier districts.

Bungulla is satisfactory for hay whilst the flour strength is equal to the f.a.q. of the State. It is resistant to flag smut but not to rust.

Hay Variety.

The variety Baroota Wonder is grown almost exclusively for hay. It is a relatively tall growing wheat and remains green to the base until haycutting time. It is very susceptible to loose smut and rust, but moderately resistant to flag smut.

Premium Varieties.

The premium wheats have received this name because in the past millers have paid a premium for them, an extra price over and above f.a.q. prices. Millers have paid these prices because it was considered that the ordinary f.a.q. wheats gave a flour too weak for the local breadmaking trade and it was thus necessary to blend in some strong or premium wheat flour to build up the f.a.q. varieties to the strength required by the local trade.

From the farmer's point of view the premium wheats yield less bushels per acre than do the f.a.q. varieties, and it is a matter of economics as to whether the increased price, based on the strength of the premium variety, compensates the grower for the decreased yield.

Since in this State the variety Comeback is normally stronger than Pusa IV when grown under the same conditions it usually commands a higher premium.

In discussing the strength of wheat it must be remembered that soil, district and climate affect this factor not only for the premium varieties, but also for the f.a.q. varieties discussed above. In general, heavy soils yield stronger wheats than do light soils and also the harder the growing conditions the stronger the wheat produced.

Comeback is an early maturing variety which generally gives yields of about two-thirds that of the f.a.q. varieties grown under identical conditions. It is resistant to flag smut and is usually rust escaping.

Pusa IV is more prolific than Comeback. It grows very vigorously and matures early. Pusa IV is resistant to flag smut but not to rust, although it usually escapes major damage.

OAT VARIETIES.

Until recently, the principal oats grown in Western Australia were introduced, but three varieties produced at the Wongan Hills Research Station are rapidly gaining in popularity.

Oats are notoriously difficult crops to harvest for grain, particularly following adverse weather conditions, and plant breeders therefore have been particularly concerned with straw strength and non-shedding. The W.A. bred oat varieties Dale, Ballidu and Wongan represent a notable achievement in respect to improved straw strength and ability to withstand unfavourable weather. These three varieties are selections made by Mr. D. R. Bateman at the Wongan Hills Research Station from a Mulga-Burt's Early cross and they fulfil the requirements of a general purpose oat. They are suitable for grain and hay and also for early green grazing and recovery. With their differing maturities they cover the range of the planting season.

Algerian, Burt's Early and Guyra were the principal oat varieties cultivated during the past twenty or so years. Mulga has now largely replaced Burt's Early. (Fig. 8.)

Oats are classified as to maturity in much the same manner as are wheats:

Very Early Maturing: Flowering four or more days earlier than Mulga.

Early Maturing: Three days earlier to six days later than Mulga.

Mid-season Maturing: Seven to fourteen days later than Mulga.

Late Maturing: Fifteen or more days after Mulga.

Oats are being increasingly used as a source of early green feed. They are sown either on fallow or stubble land in early April and fed off six to eight weeks after the opening rain of the season. Varieties vary considerably in their suitability for this purpose both in respect to the quantity of green feed produced and in their ability to recover after grazing. (Thomas and Millington, 1944.)

Oats are used extensively for hay for which purpose the leading varieties are well suited. The present oat breeding programme aims at the development of

varieties combining large grain size and straw strength and the retention of the long juvenile phase of Fulghum in a stonger strawed variety.

Annual Rainfall.	APRIL.	MAY.		JUNE.
	3rd–4th Week.	1st–2nd Week.	3rd–4th Week.	1st–2nd Week.
Below 14 in.	Dale	Ballidu Guyra	Ballidu Mulga Wongan	Wongan
14 in.–18 in.	Algerian	Dale Guyra	Ballidu Mulga	Wongan
Over 18 in.	Algerian	Algerian Dale	Guyra Ballidu	Mulga Wongan

When planting for hay, sow seven to 10 days earlier than for grain.

The following are short descriptions of the recommended varieties:—

Late Maturing.

Algerian.—This variety is cultivated chiefly in the Great Southern areas of the wheat belt, where it is a useful general purpose variety. It is also used extensively for oatmeal manufacture.

Midseason Maturing.

Guyra.—The principal midseason variety, Guyra is notable chiefly for its plump grain. Although a popular hay variety the straw tends to be very coarse under favourable conditions of growth and lodging frequently occurs where crops are left for grain. Guyra is an indifferent variety for grazing and recovery since the early growth is relatively sparse and the grain yields subsequent to grazing, only fair.

Fulghum.—This is not a good general purpose variety as the straw strength is very poor. Fulghum is used principally for grazing and recovery since the notable length of its leafy growth phase prior to "shooting" enables it to be grazed later in the season than other midseason varieties. As a grazing oat the initial growth is not as vigorous as that of Dale but it is, however, very suitable for late winter or early spring feed.

The grain of Fulghum is suitable for oatmeal manufacture.

Dale. -This has given satisfactory results as a general purpose variety under a wide range of conditions. It is markedly superior to other midseason varieties in respect to straw strength and for early grazing.

Early Maturing.

Mulga.—The most extensively grown early maturing variety but it is weak strawed and frequently lodges when left for grain. Rather tall growing, it is suitable for hay, but is markedly inferior as a variety for grazing and recovery. The early growth of Mulga is sparse and it is also very sensitive to over grazing. It is anticipated that Mulga will be largely replaced by Ballidu.

Ballidu.—This variety has demonstrated its general superiority to Mulga in trials on research stations and is proving satisfactory on farmers' holdings. The straw strength and grain yields are outstanding whilst its vigorous, leafy early growth and satisfactory recovery make it suitable for grazing and recovery.

Very Early Maturing.

Wongan.—This is notable for its vigorous early growth and strong straw. It is satisfactory as a hay variety although it is often rather short strawed. As a grain variety, it stands well but tends to shed if left unharvested after it has matured.

The vigorous early growth makes Wongan a suitable variety for early winter feed, but it cannot be grazed as late in the season as Ballidu and the midseason varieties if recovery for grain is desired.

BARLEY VARIETIES.

Of the three cereals under discussion, barley is the least cultivated, but as indicated earlier, the area sown for all purposes has increased considerably over the past 10 years.

Barleys are normally classified as being either two-row or six-row types and according to their suitability or otherwise for malting.

Suitable malting barleys are found both in the two-row and six-row types, but local maltster's technique is based upon the use of the two-row types. Prior to the outbreak of war there was an expanding export of six-row malting types to the United Kingdom, but this has, owing to shipping and other difficulties been temporarily suspended.

The selection of barley varieties for seed depends, therefore, upon the purpose for which the crop is to be grown. Practically all varieties in cultivation in Western Australia are early maturing and therefore the planting date will be dependent upon whether the crop is to be used for malting grain, fodder grain or green feed.

Barley for malting purposes is usually seeded during the latter half of May. When grown as a feed grain it is planted when convenient, usually after the wheat and oats have been sown. Barley for green grazing is customarily sown in April.

Description of the two recommended varieties are:—

Atlas.—A six-row malting type barley introduced from California. It is also known in this State as Californian six-row barley. It is used in England for malting purposes in the production of light sparkling bottled beer and prior to the war exports of suitable samples were increasing substantially. This barley is also eminently suitable for early green feed for which purpose it is at present mainly grown; a small quantity is used for malting locally in order to maintain a nucleus of the industry. It is very suitable also for feed grain purposes, being superior in yielding capacity to Cape. The results of trials with this typical six-row barley indicate that it is superior to oats as a source of early green feed, particularly at the time of the first grazing.

Prior.—A two-row barley which is the most important malting variety grown in the Commonwealth. Although it is generally considered that Prior is a strain of English Archer malting barley, there is no record of the variety from which it actually originated or the methods by which it was developed (Scott, 1941). This variety, which proved to be much more prolific and superior in malting quality to other malting barleys, was named after Mr. Samuel Prior of Brighton, South Australia, who obtained one bag of seed of unknown origin from an Adelaide seedsman in 1900. It was from this seed that the strain was developed, Messrs. Barrett Bros., maltsters of South Australia, being responsible for its initial distribution. Prior is also a useful variety for green fodder purposes.

PURE SEED DISTRIBUTION.

Pedigree seed wheat, oats and barley have been produced and distributed by the wheat belt research stations since 1912. The quantity distributed annually, increased up to a peak of approximately 10,000 bags in 1930, but with the depression years and recession of the more marginal areas from wheatgrowing, distributions decreased and over the past 10 years have averaged approximately 4,000 bags. Further, with the greater diversification in agricultural practice, the proportion of wheat has declined and the oats increased.

Pedigree barley seed was first made available from the 1937-38 harvest and at present about 200 bags are distributed to farmers each year.

Though the use of graded seed is customary, this practice does not prevent admixture or maintain the purity of a particular variety. By obtaining seed which is the direct result of the selection of a single plant developed from a single seed, the purity and inherent characteristics of a given variety are maintained. Many farmers, therefore, regularly obtain small supplies of pedigree seed, produced at the Agricultural Research Stations, to plant their own "stud" plots, the seed from which is available for their main plantings the following season.

For distribution from the 1944-45 harvest, it is anticipated that seed of the recommended varieties described earlier in this paper, will be available.

It should be noted, however, with regard to the wheat variety Eureka II and the oat Fulghum, that, if available for distribution, the actual quantity will be very limited.

Conditions of purchase will be the same as for last season, farmers being able to obtain their supplies either on a cash basis or in exchange for their own f.a.q. wheat delivered at the siding.

The rates of exchange and cash prices for wheat, oats and barley are:—

Exchange.

Four and a half bushels f.a.q. wheat* for three bushels pedigree seed wheat or barley; 3¾ bushels f.a.q. wheat* for three bushels pedigree seed oats.

Cash.

Wheat Belt Areas. Wheat and barley, 18s. per bag of three bushels; oats, 13s. 6d. per bag of three bushels.

South-West Areas: Wheat and barley, 18s. per bag of three bushels; oats, 15s. per bag of three bushels.

All of the above transactions are inclusive of rail freight to applicant's siding.

SUMMARY.

The development and utilisation of the three cereals, wheat, oats and barley, in wheat belt agriculture are presented.

With the greater diversification of agricultural practice consequent upon increased stock husbandry, the areas of the cereals sown for fodder purposes have risen rapidly over the past 10 years. Oats has shown the greatest increase.

The desirability of obtaining regular supplies of pure seed is stressed and some of the problems and objectives of the plant breeder presented.

* Or its equivalent in docked wheat.

For the three major rainfall zones, suggestions, based on statistical data, are made regarding the relative areas to be seeded with the different maturities of the cereals. The distribution of these maturities have been mapped.

Recommended varieties are described and notification made that it is anticipated that supplies of these varieties will be available, as graded pedigree seed, from the 1944-45 harvest.

ACKNOWLEDGMENTS.

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APPENDIX—TABLE A.

AREAS SOWN TO WHEAT, OATS, AND BARLEY FOR GRAIN, HAY, AND GREEN FODDER, 1909-1943.

Season.	Wheat.				Oats.				Barley.					
									Grain.		Total. Grain.	Hay.	Green Fodder.	Total.
	Grain.	Hay.	Green Fodder.	Total.	Grain.	Hay.	Green Fodder.	Total.	Malting.	Other.				
	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)	acres. (1,000)
1909-10 ..	448·9	101·6	Not Itemised	550·5	73·3	55·0	1·8	130·1	4·3	3·7	8·0	0·3	0·9	9·2
1910-11 ...	581·9	135·5	,,	717·4	61·9	38·6	1·2	101·7	1·5	1·9	3·4	Not Itemised	0·6	4·0
1911-12	612·1	284·1	,,	896·2	77·5	58·4	1·1	137·0	1·2	2·5	3·7	,,	0·7	4·4
1912-13 .	793·1	176·7	,,	969·8	127·6	52·9	1·8	182·3	2·4	3·2	5·6	0·1	1·0	6·7
1913-14 . .	1,097·2	195·5	,,	1,292·7	133·6	49·8	3·5	186·9	6·4	5·1	11·5	0·2	1·5	13·2
1914-15 .	1,376·0	266·1	,,	1,642·1	96·1	64·0	4·0	164·1	3·1	3·9	7·0	0·4	1·9	9·3
1915-16 .	1,734·1	226·0	,,	1,960·1	104·1	62·6	2·5	169·2	4·6	5·5	10·1	0·3	2·1	12·5
1916 17 ...	1,566·6	188·3	,,	1,754·9	122·2	51·3	11·6	185·1	5·2	5·9	11·1	Not Itemised	2·2	13·3
1917-18	1,249·8	208·3	..	1,458·1	95·7	56·0	14·3	166·0	1·5	3·6	5·1	,,	2·7	7·8
1918-19	1,146·1	190·4	..	1,366·5	141·5	58·6	11·8	211·9	4·0	4·0	8·0	,,	1·8	9·8
1919-20 .	1,041·8	234·8	,,	1,276·6	191·9	91·2	15·0	298·1	4·9	4·3	9·2	,,	2·7	11·9
1920 21 . .	1,275·7	169·3	,,	1,445·0	193·5	96·2	15·8	305·5	4·5	6·2	10·7	,,	2·2	12·9
1921 22 .	1,336·2	222·2	2·2	1,560·6	162·9	111·4	13·7	288·0	4·1	3·8	7·9	,,	1·6	9·5
1922-23 .	1,552·9	307·1	3·0	1,863·0	214·3	123·2	13·9	351·4	4·9	4·3	9·2	,,	1·7	10·9
1923 24 .	1,656·9	223·8	4·6	1,885·3	241·6	103·7	29·3	374·6	4·8	3·9	8·7	,,	1·8	10·5
1924-25 .	1,867·6	242·2	4·5	2,114·3	319·0	153·3	55·1	527·4	5·9	5·7	11·6	,,	2·0	13·6
1925-26 .	2,112·0	238·1	8·3	2,358·4	278·3	150·0	71·0	499·3	8·7	4·6	13·3	,,	2·5	15·8
1926-27 .	2,571·2	207·8	6·1	2,785·1	234·8	148·1	79·0	461·9	9·1	4·7	13·8	,,	3·6	17·4
1927-28 .	2,998·5	223·8	5·9	3,228·2	235·5	130·1	56·4	422·0	8·5	3·6	12·1	,,	1·4	13·5
1928-29 .	3,313·5	250·8	8·9	3,603·2	325·8	160·7	97·6	584·1	10·9	3·5	14·4	,,	2·6	17·0
1929 30 .	3,568·2	209·9	4·7	3,782·8	385·1	198·5	107·4	691·0	17·8	5·8	23·6	0·2	3·6	27·4
1930-31 .	3,955·8	192·3	6·7	4,154·8	274·9	247·0	84·0	605·9	13·2	4·0	17·2	0·1	2·9	20·2
1931-32 .	3,158·9	198·0	4·1	3,361·0	267·9	167·3	79·2	514·4	9·7	4·9	14·6	0·1	2·7	17·4
1932-33 .	3,389·4	173·3	2·9	3,565·6	285·9	224·0	78·4	588·3	8·7	5·1	13·8	0·2	2·7	16·7
1933-34 .	3,183·2	216·7	5·0	3,404·9	342·6	238·7	108·2	689·5	17·6	6·9	24·5	0·4	3·2	28·1
1934-35 .	2,764·4	139·0	3·8	2,907·2	408·8	251·3	140·2	800·3	21·2	5·4	26·6	0·1	4·5	31·2
1935-36 .	2,540·7	214·4	5·9	2,761·6	448·7	250·0	157·0	855·7	22·3	9·3	31·6	0·1	4·8	36·5
1936 37 .	2,575·3	201·8	16·7	2,793·8	463·1	241·5	219·7	924·3	28·4	11·7	40·1	0·2	10·3	50·6
1937 38 .	3,026·4	175·4	13·1	3,214·9	386·1	220·9	195·5	802·5	32·6	12·3	44·9	0·2	11·5	56·6
1938-39 .	3,412·8	165·2	35·4	3,613·4	426·1	204·6	248·8	879·5	56·6	18·3	74·9	0·4	21·1	96·4
1939-40	2,970·4	135·1	20·4	3,125·9	452·8	213·2	305·1	971·1	55·2	27·5	82·7	0·5	32·0	115·2
1940-41 ..	2,625·4	228·7	67·7	2,921·8	429·4	149·9	304·8	884·1	39·8	25·8	65·6	0·8	37·8	104·2
1941 42 ...	2,653·4	121·9	27·7	2,803·0	407·3	166·8	259·8	833·9	(a) 30·9	(b) 37·5	68·4	0·7	31·0	100·1
1942 43 ...	1,753·2	100·9	23·6	1,877·7	342·3	118·0	266·5	726·8	(a) 19·7	(b) 29·8	49·5	1·1	34·7	85·3
1943 44	1,568·2	117·2	41·6	1,727·0	358·3	123·8	344·5	826·6	(a) 29·9	(b) 31·5	61·4	0·8	30·5	92·7

(a) 2 row. (b) 6 row.

Crush Bails for Dairy Cows.

A. H. HOBBS, Dairy Instructor, Fremantle.

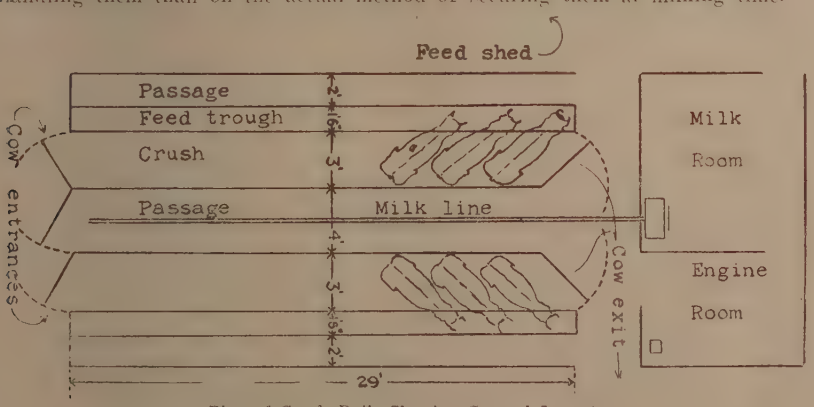
Owing to the need for increased output of dairy products, and the necessity for milking larger herds with decreased manpower, a demand has been created for suggestions relative to the handling of dairy cows, which will tend to speed up the milking process, while at the same time reducing the work required to do it.

With some types of milking sheds in general use, a large amount of the time and energy taken in milking the herd, is used in putting the cows in the bails, securing them, and letting them out after milking, e.g., where herds of 50 or 60 cows are milked in eight bails with a 4-unit milking plant.

Normally this method is rapid and easy enough provided there are sufficient hands to do the small jobs, such as yarding, bailing, feeding, letting out, etc., but if the staff be reduced to one operative, the job becomes almost an impossibility and the operative is quickly disheartened.

The accompanying sketch illustrates a type of milking shed, the adoption of which should reduce the abovementioned small jobs to a minimum. It may be seen in operation on the property of Mr. H. Della, of Keysbrook, and another is in use in the same district and one at Pinjarra. All three have milking machines installed, and herds varying in number from 50 to 70 are handled.

Unfortunately the type has become known as the "Crush Bail," which term produces the impression that its use reduces dairy cows to handling conditions similar to those of bullocks on a cattle station. Actually this is not so, as there is a vast difference between dairy cows coming in to be fed and relieved of their milk, and cattle being forced into a crush; for in the majority of cases, the docility and contentedness of dairy cows depends more on the character of the person handling them than on the actual method of securing them at milking time.



Plan of Crush Bails Showing General Layout.

Some difficulty is experienced with a new shed of this type in getting the older cows used to it, but not to an abnormal extent, and any farmer who has built a new shed of any type will be quite conversant with the difficulties in this direction over the first few days. Once they become used to it, the cows are seen to walk in quietly, eagerly, and take their feed quite contentedly. It was noticed that young heifers standing closely between older cows seemed quieter than when bailed alone, and possibly this is in some degree due to the fact that not being able to see what the operative is doing, they are less nervous.

A further advantage is that the cows are in the "crush" for a longer period than it takes to milk each one, and hence, bearing in mind the proposal to feed large amounts of concentrates, the cows have more time to consume them.

Milking sheds of the double bail variety with a two-bail width of 7 ft. 6 in. usually have a floor area of 30 ft. x 12 ft. to accommodate eight cows, while with the "crush" type a floor space of 29 ft. x 18 ft. accommodates 18 to 20; thus a large number of cows can be effectively handled in a relatively small space, and the much disliked job of cleaning the shed after milking can be done with a minimum of effort.

As will be seen from the sketch, the hind part of the cow from the loin back is exposed to the operator, the milk pipe line runs down the centre, and the machine claws may be utilised on either side, the usual procedure being that all those on one side are milked first, then that crush is emptied, the feed trough replenished and the crush refilled while those on the other side are being milked.

The "crushes" when full hold 18 big cows or 20 small ones, i.e., nine or 10 on each side, and a five-unit plant is used and operated by one man. This man feeds, washes, and milks 40 to 50 cows in an hour, and he asserts that if the "crushes" were long enough to house two more cows on either side he could comfortably handle six units.

The central rails of the "crushes" and the board supporting the milk line are suspended from the tie beams and the rails being 3 ft. from the floor, the udders of the cows can be reached with ease from the centre passage way. In addition the absence of posts facilitates the handling of the claws, washing of udders, etc., and the floor having a slight fall both ways to the centre may be hosed down with ease.

The idea could not be used satisfactorily for hand milking as there is not sufficient room to sit comfortably under the cow, but its adoption for the milking of large herds by machine should assist in overcoming the labour problem on some farms.

Non-Stripping of Cows.

M. CULLITY, Superintendent of Dairying.

Considerable publicity has been given during the past two or three years to the non-stripping of cows after machine milking. Evidence has accumulated in Western Australia that it is a practice which can be adopted with confidence, as production will not be affected, except to a very small extent during the transitory period, and that labour requirements will be reduced.

DENMARK RESEARCH STATION.

One of the first herds in which the practice was adopted was that of pure bred Guernseys at the Denmark Research Station, where stripping was discontinued in March, 1941.

The following statistical information is submitted showing that there has been no decline in production. It will be seen that yields have shown a tendency to rise.

In Table 1 are shown the total milk and butter-fat yields for the monthly day of testing for all cows under test. In the first period—April, 1940, to March, 1941—all the cows were stripped. From April, 1941, all newly-calved cows were milked without stripping, while those approaching the end of their lactations were stripped until they dried off, then on calving they came under the new method.

TABLE 1.

Denmark Research Station.

TWENTY-FOUR HOURS' YIELD—TAKEN FROM MONTHLY TEST SHEETS.

Stripping.

Month.	Milk per day.	Butter Fat.	No. of Cows.
	lb.	lb.	
1940—			
April	264	14·803	20
May	321	15·235	18
June	352	17·136	18
July	472	23·930	21
August	532	25·724	24
September	556	28·607	21
October	648	34·727	25
November	730	40·584	27
December	633	37·872	27
1941—			
January	591	33·485	27
February	368	20·903	22
March	400	24·375	24
	5,867	317·381	274
Averages	21·412 lb. per day	1·158 lb. per day	

Non-Stripping.

1941—			
April	309	20·503	20
May	266	16·282	15
June	334	20·730	17
July	251	15·790	11
August	314	18·607	12
September	559	29·618	17
October	580	30·442	17
November	670	38·408	22
December	885	48·717	28
1942—			
January	852	45·197	29
February	613	35·692	29
March	650	39·582	31
	6,283	359·568	248
Averages	25·334 lb. per day	1·449 lb. per day	

Non-Stripping.

1942—			
April	734	41·736	31
May	694	40·007	30
June	460	28·811	25
July	469	27·644	22
August	537	29·553	23
September	515	27·619	19
October	486	24·711	18
November	629	32·418	24
December	684	35·019	25
1943—			
January	563	28·806	21
February	533	28·974	22
March	606	32·476	25
	6,910	377·774	285
Averages	24·245 lb. per day	1·325 lb. per day	

Table 1—*Continued.*

Non-Stripping.

Month.	Milk per day.	Butter Fat.	No. of Cows.
1943—	lb.	lb.	
April	631	37·402	25
May	549	30·437	23
June	582	32·916	24
July	514	30·292	24
August	470	23·764	22
September	499	26·026	17
October	609	31·817	21
November	768	41·141	26
December	744	39·254	25
1944—			
January	749	41·810	29
February	535	29·734	26
March	490	26·636	24
	7,140	391·229	286
Averages	24·965 lb. per day	1·367 lb. per day	

Note.—All the foregoing figures are without any age allowances, and are taken from the test sheets.

SUMMARY OF YIELDS.

	Milk per day.	Butter Fat per day.
	lb.	lb.
Stripping—		
April, 1940, to March, 1941	21·412	1·158
Non-Stripping—		
April, 1941, to March, 1942	25·334	1·449
April, 1942, to March, 1943	24·245	1·325
April, 1943, to March, 1944	24·965	1·367

It will be noted that non-stripping has not prevented an increase in average yields.

In Table 2, are shown the actual herd test yields of all the cows for which records are available for a lactation immediately before stripping ceased and for lactations since. Twenty-four cows are listed and these averaged 7,707 lb. milk and 374.99 lb. of butter-fat in the last lactations in which they were stripped and 7,793 lb. milk and 435.7 lb. butter-fat in the first lactations when they were not stripped.

Since the adoption of this practice there are a number of cows which have completed test records and which have never been stripped. These are shown in Table 3.

In all, 71 lactations have been completed since the change over to the new method, for an average of 6,789 lb. milk and 389.53 lb. of butter-fat.

During the current year 25 cows have completed their test period and have yielded 7,397 lb. of milk and 392.30 lb. of butter-fat. It should be noted also that the period from November, 1943, to June, 1944, was particularly unfavourable inasmuch as little rain fell and is admitted to be the worst summer and autumn the dairying industry has experienced.

TABLE 2.

PRODUCTION RECORDS OF COWS WHICH HAVE BEEN STRIPPED AND LATER CHANGED TO NON-STRIPPING.

	Milk. lb.	Butter Fat. lb.	Age.	
Denmark Rosette	5,712	341·84	Jr. 3	stripped
	6,994	418·13	Mat.	not stripped
	7,767	452·22	Mat.	not stripped
D. Dawn Childe	6,285	366·04	Jr. 3	stripped
	6,492	372·39	Jr. 4	not stripped
	5,688	304·82	Mat.	not stripped
D. Diana	7,005	351·13	Jr. 3	stripped
	7,719	416·33	Mat.	not stripped
	6,303	353·12	Mat.	not stripped
D. Bonnie Mary	4,680	232·49	Jr. 2	stripped
	7,641	424·44	Jr. 3	not stripped
	7,896	426·74	Mat.	not stripped
D. Dawn 2nd	7,683	493·10	Mat.	stripped
	9,354	601·49	Mat.	not stripped
	8,721	484·26	Mat.	not stripped
D. Golden Dawn	7,253	448·57	Mat.	stripped
	7,863	503·13	Mat.	not stripped
	8,190	474·57	Mat.	not stripped
D. Golden Glory	4,896	254·04	Jr. 2	stripped
	6,924	374·22	Jr. 3	not stripped
	7,872	428·68	Jr. 4	not stripped
	7,732	396·42	Mat.	not stripped
D. Orangebud	7,479	345·86	Mat.	stripped
	12,198	629·93	Mat.	not stripped
	11,328	537·73	Mat.	not stripped
D. Rosemary	7,336	400·06	Sr. 3	stripped
	7,194	512·99	Mat.	not stripped
D. Golden Day	5,502	278·77	Jr. 4	stripped
	8,079	426·48	Mat.	not stripped
	6,393	353·68	Mat.	not stripped
D. Angeline	5,199	271·46	Jr. 2	stripped
	7,173	417·37	Jr. 3	not stripped
	7,041	395·44	Sr. 4	not stripped
	4,242	238·91	Mat.	not stripped
D. Golden Marie	7,266	384·98	Mat.	stripped
	7,481	446·41	Mat.	not stripped
D. Orange Pekoe	6,717	309·89	Jr. 3	stripped
	8,487	468·96	Mat.	not stripped
	7,752	341·74	Mat.	not stripped
D. Prosper's Lady	6,408	353·50	Mat.	stripped
	6,757	409·45	Mat.	not stripped

Table 2—*Continued.*

	Milk. lb.	Butter Fat. lb.	Age.	
D. Prosper's Rosa	7,557	369·02	Mat.	stripped
	7,860	445·30	Mat.	not stripped
	8,232	446·77	Mat.	not stripped
D. Rose Dame 4th	7,263	376·27	Mat.	stripped
	8,349	429·62	Mat.	not stripped
D. Rose Ophelia	6,375	310·16	Sr. 4	stripped
	5,616	286·91	Mat.	not stripped
D. Velda	6,903	340·12	Jr. 4	stripped
	7,906	352·55	Mat.	not stripped
	7,668	352·12	Mat.	not stripped
D. Wild Rose	6,204	299·51	Sr. 3	stripped
	6,252	333·28	Mat.	not stripped
	6,723	333·67	Mat.	not stripped
Koojan Golden Ripple ...	5,994	344·28	Sr. 2	stripped
	5,985	318·94	Jr. 4	not stripped
	5,532	291·04	Mat.	not stripped
Coogely Jonquil	5,130	318·58	Jr 3	stripped
	6,777	412·81	Jr. 4	not stripped
	6,876	479·16	Mat.	not stripped
D. Mary Rose	3,813	248·01	Jr. 2	stripped
	6,697	386·95	Sr. 4	not stripped
D. Velvet	4,554	240·27	Jr. 2	stripped
	6,648	327·75	Sr. 3	not stripped
	6,951	307·03	Sr. 4	not stripped
Koojan Ace's Dulcie ...	6,963	405·20	Mat.	stripped
	8,040	473·81	Mat.	not stripped
	6,333	356·20	Mat.	not stripped

TABLE 3.

PRODUCTION RECORDS OF COWS WHICH HAVE NEVER BEEN STRIPPED.

	Milk. lb.	Butter Fat. lb.	Age.	
Denmark Petal	7,983	525·95	Jr. 4	not stripped
	9,021	502·45	Mat.	not stripped
D. Golden Dawn 2nd ...	4,330	257·35	Jr. 2	not stripped
	4,587	280·62	Jr. 3	not stripped
D. Anna	5,790	336·20	Jr. 2	not stripped
	7,245	421·51	Jr. 3	not stripped
D. Golden Maria	7,176	398·82	Jr. 2	not stripped

Table 3—*Continued.*

	Milk. lb.	Butter Fat. lb.	Age.	
D. Lady Diana	3,498	210·18	Jr. 2	not stripped
D. Pink Rose	6,036	335·97	Jr. 3	not stripped
	7,425	407·96	Jr. 4	not stripped
D. Golden Valencia	7,242	374·37	Jr. 2	not stripped
	7,383	355·18	Jr. 3	not stripped
D. Dame	8,418	396·28	Sr. 4	not stripped
D. Briarette	4,458	248·27	Sr. 2	not stripped
D. Jonquil	2,370	125·03	Jr. 2 (sick)	not stripped
	8,812	504·22	Jr. 3	not stripped
D. Briar Rose	6,687	362·24	Jr. 4	not stripped
	9,333	496·93	Mat.	not stripped
D. Golden Valencia 2nd ...	6,672	385·81	Jr. 2	not stripped
	9,096	496·14	Jr. 3	not stripped
D. Rosebud 2nd	7,596	415·39	Jr. 4	not stripped
K. Golden Ripple	5,985	318·94	Jr. 4	not stripped
	5,532	291·04	Mat.	not stripped
D. Bonnie	5,559	283·68	Mat.	not stripped
D. Damon's Pekoe	4,227	220·35	Jr. 2	not stripped
D. Morning Glory	4,815	263·15	Jr. 4	not stripped

It is of interest that two new records for the Guernsey breed were established by cows in this herd in the last two years:

"Denmark Golden Valencia 2nd" as a senior three-year-old, produced 9,096 lb. milk, average test 5.45 per cent., 496.14 lb. butter-fat: in the following year, "Denmark Jonquil," in the same age class, surpassed this performance by producing 8,812 lb. milk, average test 5.72 per cent., 504.22 lb. butter-fat. These cows have never been stripped.

The manager of the Research Station, Mr. V. E. Randell, reported that no difficulty was experienced in the change-over. There was no loss of production and he has since claimed there has been a reduction in udder troubles. Cows which were a little hard to milk by hand have shown improvement and do not suffer any of the tenderness noticed at times when they were being stripped. The same amount of labour was always available and it is claimed that a saving in time has been effected. This has been estimated at 20 minutes per milking; the cows, therefore, have 40 minutes longer in the fields daily.

Mr. Randell found that the last milk could be taken from the udder by drawing the teat-cups downwards by applying a little weight by the hand.

REPORTS OF DISTRICT OFFICERS.

The experience at the Research Station has been of value to the whole of the dairying districts on the south coast, as indicated in the following extracts from reports of district officers.

C. W. Tobin—Albany.

"A recently carried out survey in connection with the adoption of non-stripping indicates the following:—

(a) Approximately 70 per cent. of farmers who have been using milking machines a year or more have given up stripping by hand. The general claim of these farmers in respect of production supports the finding of the Research Station manager. They state they would not revert to hand stripping because of the benefits they enjoy with non-stripping.

(b) Twenty per cent. of farmers claim that some stripping is necessary with some cows, otherwise a quantity of milk remains in the udder. They state that some cows are hard milkers, and are afraid of losing production by the total cessation of stripping, but have no evidence to support this fear.

(c) Only about 10 per cent. of the farmers with machines have not yet adopted non-stripping, and their reason is usually that they disapprove of leaving any trace of milk in a cow's udder for fear it should affect daily production or cause the premature drying off of the cow."

R. A. Paul—Bunbury.

"*Owner A.*—Does not strip cows and is quite satisfied with the results, there being no increase in disease or decrease in production. Unable to give estimate of increase in speed of milking, but has saved the labour of a girl in the shed; is now able to do the milking on his own.

Owner B.—Has not stripped herd for two years and is entirely satisfied with results. Estimates that four per cent. of the cows do not respond to non-stripping. From eight to 10 cows per unit per hour, is his estimate of speed of milking. Saving in time is considerable and he claims cows are more contented.

Owner C.—By doing away with stripping can manage a three-unit machine on his own with comfort, doing 24 to 26 cows per hour. This time includes the labour of bailing, washing udders, etc. No complaints in regard to production or incidence of udder disease.

Owner D.—Has not stripped cows for two years and is very well satisfied. Claims he can keep a four-unit machine going on his own and do up to 50 cows per hour.

Owner E.—Cows stripped up to August, 1943, when quantity of strippings was 40 lb. from 34 cows. Ceased stripping during that month; tried the cows out again in November, 1943, when the total strippings from 40 cows was 15 lb. These figures are for single milkings. This owner has a three-stand machine and is at present milking 36 cows in 70 minutes on his own."

V. E. Weston—Harvey.

"(1) Most farmers are satisfied there is no loss of production or reduction of butter-fat content, once the cows settle down to the routine.

(2) Lactation period is not shortened.

(3) Majority of farmers think no time is gained, but some do claim this.

(4) All farmers claim definitely that less labour is required.

(5) About half say udder diseases are less, and the other half state they are about the same as previously, but no one has expressed the opinion they are worse. Some say "drying-off" when necessary is easier and safer than before, particularly with those cows which previously proved to hold back considerable strippings.

(6) All farmers claim cows are more contented, less nervous and fidgety and the necessity to leg-rope is almost eliminated—also cows in the habit of kicking off the cups cease doing so.

(7) In the main farmers claim old cows readily respond once they are accustomed to the habit, which takes about three weeks to acquire. Some state that cows previously retaining considerable strippings can be trained to milk right out.

(8) Very few farmers eliminated cows as unsuitable for not stripping. There was one exception—he began three years ago on first calf heifers only, sold the others, until today no cow on the farm has ever been stripped.

(9) One producer with a large herd claimed better and more uniform cream grades. He maintains that hand stripping contributes most of the filth in machine milk.

(10) Only very few will start stripping again, even when labour is plentiful. The great majority regard the practice as a progressive step to their advantage.

Owner F.—Started because of labour shortage; he claims he has saved the time and wages of two boys for his 60-cow herd. He has a four-stand plant.

Owner G.—With four-units, saves labour of one man in milking 60 cows at the rate of 35 per hour.

Owner H.—With two men, milks 90 cows in 90 minutes with six-unit machine and claims that he saves the time of two men.

The above examples are average for number of cows milked per unit, per man and for time of milking. The time of milking varies considerably with individuals and with the design of milking sheds and yards. From the figures submitted the average time of milking would be about six minutes per cow and one man would handle 11 cows per unit in 1½ hours and two men 15 cows per unit in 1½ hours. Few dairies employ over two hands. There would be no appreciable saving of labour in herds of about 25-cow strength."

RECOMMENDATIONS.

If full benefit is to be obtained it is necessary that the machine be efficiently operated in accordance with the instructions of the maker. The following points require attention:—

(1) Proper tension of teat cup inflations.

(2) Uniform engine speeds with not less than the stipulated number of pulsations per minute.

(3) Full vacuum recommended by the maker.

(4) The starting of the cow, or encouraging the "letting down" of milk before the teat cups are attached. This can be achieved in most cases by washing the udders approximately one minute before.

(5) The adoption of a fixed time for the machines to remain on the cows. This is intended to encourage fast milking.

In connection with (5) an interesting experiment at the New York State Agricultural Experiment Station, showed that by adopting a time limit of four to five minutes per cow, milk production was maintained as uniformly through the lactation period as when milked by hand. When the milking process was allowed to extend over nine to ten minutes per cow, milk production was not so uniform and started to fall more rapidly after three months. It was found that cows gradually adjusted themselves to the shorter milking period and heifers were brought on to it without trouble. Over a period of five years, it was found that 90 per cent. of the cows did not require stripping.

(6) Attention to the teat-cups before removal. It will be found with many cows, that the teat-cups tend to draw more of teats and portion of udder into the cavity as the udder becomes empty. This tends to close the teat-cups and prevent the passage of the last milk. This can be rectified by drawing down the teat cups for a few moments before removing them.

It is believed that if attention is given to these points, no difficulty will be experienced in discarding stripping. There will always be certain cows, usually hard-milking ones, which will prove difficult, but it is suggested that the gradual elimination of these from the herd should be aimed at to allow uniform practice with all of the herd.

SUMMARY.

The practice of non-stripping has been adopted by a number of farmers in other districts and reports from district officers disclose that the majority are satisfied with the results. It has its greatest appeal to those with herds of 40 cows or more and who are short of labour. In the smaller herds, milked by two or three-unit machines, there is usually sufficient time to strip all cows and these farmers are loth to change their methods. However, a sufficient number of farmers are now converts to warrant the statement that the method is proved satisfactory, it saves time, permits of the milking of larger herds with less labour and so gives a saving in costs, does not increase udder troubles but rather tends to reduce them and at the same time allows full production to be obtained.

Rapid Milking of Dairy Cows.

The accompanying photographs and descriptions were prepared by Dr. W. E. Petersen, of the Minnesota College of Agriculture in order to emphasise the value of rapid milking and of letting the milking machine do the stripping.

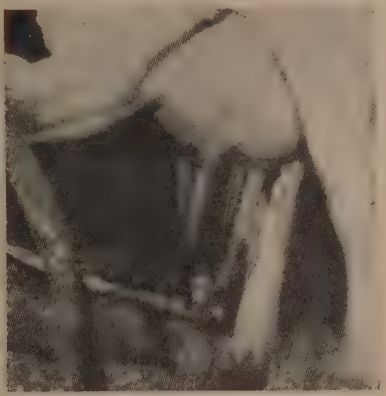
The value of regularity in the time and method of milking is important in making the change to faster milking. It will be found that faster milking gives just as much milk and is better for the cow.

Dr. Peterson claims that most cows will milk out in three and a half minutes and some in two and a half minutes.

In the change-over little loss of production will occur, most cows not being affected and those falling in production will return to normal in a few days.

1. Massage Teats and Udder.

Cows must be properly stimulated if they are to let down their milk freely and completely. Ordinarily the milk stays in the tiny cells where it is made until some means of stimulation, such as washing the udder or the act of milking, causes a muscular contraction which squeezes the milk down into the cisterns and teats.



2. Start Milking One Minute Later.

It normally takes a cow 45 seconds to let down her milk. Starting the machine one minute after stimulation shortens the time the machine must work to get out the milk. More important, there is less danger of injury to teats and udder if the machine works only while the milk flows freely.

3. Don't let Teat and Cups Crawl.

As milking progresses, the lower part of the udder becomes soft and flabby, offers less resistance to the tugging action of the machine. Teat cups crawl up on these soft tissues and shut off the milk ducts leading into the teats. When this happens, the last milk in the udder cannot get through. Incomplete milking results.

4. Strip by Machine.

When teat cups crawl, pull them down part way, using the free hand to massage the udder. The pinching off action stops, the milk ducts open, and the rest of the milk can be taken out by machine. Take the machine off as soon as the milk ceases to flow. Leaving it on invites injury which may lead to mastitis.

The Rationing of Feeding Meals in Western Australia.

1944.

L. J. H. TEAKLE and K. NEEDHAM.

1.—*The Position Prior to 1944.*

For several years prior to the present war, the consumption of feeding meals for stock in Western Australia had been increasing rapidly. Stock feeders who made use of this material soon became convinced of its value, particularly for pigs and poultry, and the result was a spectacular increase in demand and consumption. Information available indicates that the imports and local production since 1935-36 have been:—

Year.	Local Manufacture.	Imports.	Total.
	Short tons.	Short tons.	Short tons.
1935–36	420	915*	1,335
1936–37	385	1,355*	1,740
1937–38	408	1,500*	1,908
1938–39	423	2,010*	2,433
1939–40	586	2,184*	2,770
1940–41	850	2,570*	3,420
1941–42	678	1,585†	2,263
1942–43	833	1,610†	2,443

* Estimated from data provided by Government Statistician. † Returns from Fremantle Wharf.

Prior to 1944, it is estimated that poultry absorbed 70 per cent. and pigs 30 per cent. of the available supplies.

Feeding meals are defined as concentrates which contain 35 per cent. or more of protein. The main protein constituent of the feeding meals used in Western Australia is meatmeal.

2.—*Difficulties in Supply in 1943.*

The above figures show that war-time conditions have effected a severe reduction in the amount of feeding meals and this reduction is due largely to shipping difficulties. This shortage was further aggravated by the diversion of much of this material to market gardeners and vignerons, who, unable to secure the desired amount of blood and bone under the rationing scheme, found it a valuable organic fertiliser. In consequence, in the latter part of 1943, many poultry and pig raisers were unable to secure adequate supplies of feeding meals, and processors were placed in a very difficult position with respect to their business interests. The position became so serious in October, 1943, that produce merchants approached the Department for assistance in the matter, and following a number of conferences, it was decided to institute a system of feeding meals rationing under

National Security Regulations.* An attempt was made to organise the distribution of imports and manufactures among the trade through a voluntary meatmeal pool, in which all importers and manufacturers were expected to participate.

3.—*Feeding Meals Rationing.*

An endeavour was made to devise a rationing scheme on two main principles:

(a) The equitable sharing of available supplies by the allocation of quotas of feeding meals to users on the basis of their stated requirements for the number of stock to be fed.

(b) Normal distribution of supplies through the usual trade channels so that users would be able to secure their requirements with a minimum of difficulty.

While these principles are simple in themselves, their application involved many practical difficulties. These have been largely resolved and satisfactory machinery is now in operation.

4.—*The Machinery Evolved.*

Machinery was designed with the object of (a) ensuring equitable distribution among importers and manufacturers; (b) ensuring distribution to retailers in accordance with the requirements of their clients; (c) securing returns from importers and manufacturers so that supplies and distribution could be watched carefully from month to month.

(a) *Distribution of Feeding Meals Amongst Importers and Manufacturers.*—The produce merchants engaged in the import and manufacturing trades after discussion with officers of the Department of Agriculture decided to form a voluntary meatmeal pool which would be given the responsibility of arranging an equitable distribution of available supplies among the participants. As a basis of distribution, it was decided that the imports and manufactures in the calendar years 1940, 1941 and 1942 would be adopted. Each merchant presented his figures for these years to the Department of Agriculture and was given a quota percentage. Each month an estimate was made of expected imports and manufactures for the ensuing month and this tonnage divided amongst the participants according to the quota percentage.

To facilitate the interchange of supplies between manufacturers and importers, quota coupons were issued to participants each month. The coupons represented each participant's share of the expected month's supplies. By this means it was hoped to effect a monthly balance in the trade. If his manufacture or importation was below the quota coupon issue, he used the excess coupons to make up his share from traders who had been more fortunate in the business and had supplies in excess of their quota coupons.

The pool had a membership of about 30 participants and its business was administered by a professional secretary.

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*National Security (Agricultural Aids) Regulations Fertiliser and Feeding Meals Restriction of Purchase and Sales), Order No. 2, gazetted in the "Commonwealth of Australia Gazette" of the 6th July, 1944, Section 4, reads as follows:—

"4. A person shall not during any month except under the authority of a consent in writing granted by a Minister, Director General of Agriculture, or authorised person, and in accordance with the terms and conditions contained in that consent, purchase or otherwise acquire or sell or otherwise dispose of to any one person any quantity of any fertilisers or feeding meals exceeding in the aggregate 7 lbs"

Owing to the introduction of retailer coupons to enable retailers to secure their supplies in accordance with their clients' quotas and the success of this system, the pool became of little importance in the rationing scheme and was disbanded. It had been very productive and was responsible in no small measure for the organisation of the rationing of feeding meals in Western Australia.

(b) *Distribution to Retailers and Users.*—The rationing of feeding meals under National Security Regulations is a function of the Department of Agriculture and the officers in charge of branches dealing with the poultry and pig industries decide on the allocation to users. Each prospective user applies for a stated quantity of feeding meals for a number of poultry and or pigs. For poultry the maximum quota allowed is 35 lb. per month per hundred laying birds and smaller amounts for other fowl. Feeding meal for pigs is confined to the non-dairy areas, where skim milk is not available, and the ration is determined according to the circumstances of each case.

Each user must secure his supplies from a nominated retailer who is deemed to have accepted the responsibility for meeting the requirements of his clients. For each client the retailer receives a permit showing the basal quota of feeding meals for a six-months period. The basal quota is the maximum allowed each user, if supplies are available. Provision is made for the issue of a percentage of the basal quota in months when the supply is inadequate to meet the ration in full. On the back of this permit the retailer must record all sales to the client so that the Rationing Office can check the supplies of feeding meal to each applicant.

To enable the retailer to secure the correct amount of feeding meals in accordance with the quotas held in favour of his clients, he is issued each month with retailer coupons, covering the total of the permits held by him. These retailer coupons are similar in form to petrol ration tickets, and must be submitted with his order to the wholesaler. They constitute an authority for the supply of feeding meals to the face value of the coupons. These coupons pass through several intermediaries before finally reaching the importer or manufacturer who returns them to the Rationing Office in support of his monthly statement of stocks, imports, manufactures, purchases and disposals.

By the issue of retailer coupons the trade between retailers and wholesalers has been facilitated greatly. The retailer holding coupons readily establishes his bona fides with any importer, manufacturer or wholesaler with feeding meals for disposal.

(c) *Returns.*—In general, detailed returns are not expected from retailers who are governed by the retailer coupon distribution. All that is required is a monthly statement showing the quantity of unexpired retailer coupons held and stocks on hand. All importers, manufacturers and processors*, must furnish detailed monthly returns in the form of a balance sheet. These are designed to show the usage of feeding meals and to enable a check to be made against retailer coupons issued and imports reported from the Government Inspectors on the wharf. Some merchants furnish excellent returns, but unfortunately there are others who have not been able to meet the requirements of the Rationing Office in this direction. It can be appreciated that accurate returns are of utmost importance in the satisfactory control of the feeding meals rationing scheme.

* Processors are those who use feeding meals in the preparation of mashes and feeding meal concentrates.

5.—The Quantitative Side of Feeding Meals Rationing.

(a) *Quotas Issued.* From the institution of rationing on 1st January, to 30th June, 1944, permits for basal quotas covering 270 short tons of feeding meals per month were issued. Of this, 190 tons have been allocated for poultry and 80 tons for pigs, the ratio being approximately 70 per cent. and 30 per cent. respectively. These represent quotas covering 1,100,000 head of poultry and 52,400 head of pigs.

(b) *The Present Supply Position.* Unfortunately the prospective supply is inadequate to meet these quotas in full. Imports and local production for the year 1943-44 amount to—

Local Production	.. ..	1,100 tons
Imports	.. ..	1,770 ..
		2,870 tons

This means that the anticipated supply of feeding meals is in the region of 250 tons per month.

(c) *Equating Quotas to Supply.* Arrangements have been made to equate the quotas of each user to the supply position, by restricting of deliveries to a determined percentage of the face value of the permits, as the occasion demands.

Retailers will receive their retailer coupons according to this percentage and will be instructed to ration their customers similarly. Up to the end of May, users were allowed 100 per cent. of their basal quotas, but as the demand took the issue of permits to purchase feeding meals beyond the tonnage available for the State, reduction became necessary. For June the ration was 90 per cent. of the basal quota. If the demand increases and the supply does not improve, it is obvious that a further cut in the quota will be necessary to ensure an equitable supply to all users.

The rationing of feeding meals has presented difficulties and caused some inconvenience to traders and users, but it has ensured an equitable sharing of available supplies within the State. It appears to have given general satisfaction and is working smoothly as the result of the willing and helpful collaboration of traders and users with officers of the Department of Agriculture responsible for the administration of the scheme.

Areas Sown to Individual Varieties of Wheat in Western Australia.

L. W. SAMUEL, Cereal Research Officer.

From the 1925-26 season to the 1941-42 season inclusive, data has been collected by the Government Statistician on the areas sown to individual varieties of wheat in Western Australia. Since the collection of this data has ceased for the present owing to war-time conditions, it seems appropriate to collect and collate the information available for what are, or have been, prominent varieties of wheat in this State.

The information for individual varieties is collected as a forecast in August each year and then later, when the season is finished, a correct total for the area

sown to wheat is obtained. The final value for the area sown is divided into three components, the area sown to wheat for (a) grain, (b) hay, and (c) green feed. If the final total area does not agree with the total for the individual varieties as collected in August then the areas for the individual varieties are adjusted proportionately. The adjustment is not large and affects only the area sown to each variety and not the proportion which each variety bears to the total area sown.

The accompanying table shows these adjusted figures for the areas sown to individual varieties of wheat (total area for grain, hay and green feed) for those varieties which have exceeded 1%—2% of the total area sown The values are expressed both as actual areas and as a percentage of the total area sown.

The data for a few of the more prominent varieties is represented graphically to illustrate the rise and fall of various varieties.

No data is available for individual varieties prior to the 1925-26 season and for the 1925-26 and 1926-27 seasons, the data is available only for the varieties Nabawa and Gluyas Early.

The table and graphs are self-explanatory but attention may be drawn to a few points:—

1. The rapid rise in the total area sown to wheat to a maximum of more than 4 million acres in 1930-31, a decrease to some 2¾ million acres in 1935-36 and in 1936-37 with another rise till 1938-39 and then a progressive fall.

2. The rapid rise in the popularity of Nabawa to a maximum in 1928-29 when more than 2 million acres, or more than 50% of the total area, was sown to this variety. Following this maximum there was a very rapid decrease in the area sown till 1935-36 and then a further slow decline.

3. The very rapid increase in the area sown to Bencubbin in the first two seasons after its distribution and then a steady increase in the percentage of the total area sown to this variety though the actual area sown has declined since the peak in 1938-39. Thus the area sown to Bencubbin in recent years has not decreased as rapidly as has the total areas sown to wheat.

4. The relative stability of the proportion of the total area sown to Gluyas Early till 1933-34 and then its decrease to a very small percentage of the total area sown to wheat.

5. The relatively stable area sown to Gluclub from 1932-33 to 1937-38 at about 9%—12% of the total area and then its increase to nearly 21% in 1941-42. Much of this recent increase in the proportion is due to a relatively stable area being sown to Gluclub in seasons of steadily declining total area.

It is regretted that these statistics are not available for the period of the compulsory restriction of acreage by one-third as it would be of considerable interest to ascertain the main varieties grown under restriction.

ACKNOWLEDGMENT.

The thanks of the author are tendered to the Government Statistician's Department for making this data available and for assistance therewith.

WHEAT VARIETIES IN WESTERN AUSTRALIA.

Acres, and Percentage of Total Acres, Sown to Individual Varieties (Total for Grain, Hay, and Green Feed).

Variety.	Season. 1925–26.		1926–27.		1927–28.	
	acres.	%	acres.	%	acres.	%
Baroota Wonder	....	....	....	....	106,957	3·31
Bena	....	....	....	....	....	....
Bencubbin	....	....	....	....	....	....
Canberra	....	....	....	....	66,398	2·06
Clubhead	....	....	....	....	....	....
Dollar	....	....	....	....	25,701	0·80
Dundee	....	....	....	....	....	....
Federation	....	....	....	....	238,119	7·38
Ford	....	....	....	....	....	....
Gallipoli	....	....	....	....	....	....
Geeralying	....	....	....	....	....	....
Gluclub	....	....	....	....	....	....
Gluyas Early	331,222	14·05	378,167	13·58	488,819	15·14
Gresley	....	....	....	....	63,519	1·97
Major	....	....	....	....	25,499	0·79
Merredin	....	....	....	....	260,127	8·06
Nabawa	958,764	40·66	1,291,589	46·39	1,506,174	46·66
Noongaar	....	....	....	....	....	....
Queen's Fan	....	....	....	....	25,541	0·79
Ranee	....	....	....	....	....	....
Totadgin	....	....	....	....	....	....
Waratah	....	....	....	....	....	....
Yandilla King	....	....	....	....	164,840	5·11
Other Varieties	1,068,457	45·29	1,115,325	40·03	256,571	7·95
Total	2,358,443	100·00	2,785,081	100·00	3,228,265	100·00
Area for Grain	2,112,032	....	2,571,187	....	2,998,523	....

Variety.	Season. 1928–29.		1929–30.		1930–31.	
	acres.	%	acres.	%	acres.	%
Baroota Wonder	82,068	2·28	60,141	1·59	70,531	1·70
Bena	....	....	68,729	1·82	133,238	3·21
Bencubbin	....	....	....	....	....	....
Canberra	58,150	1·61	60,212	1·59	86,968	2·09
Clubhead	30,248	0·64	67,292	1·78	75,782	1·82
Dollar	40,813	1·13	39,704	1·05	....	....
Dundee	....	....	....	....	....	....
Federation	148,825	4·13	152,822	4·04	166,158	4·00
Ford	34,829	0·97	70,686	1·87	81,405	1·96
Gallipoli	....	....	....	....	62,468	1·50
Geeralying	....	....	....	....	....	....
Gluclub	....	....	....	....	57,675	1·39
Gluyas Early	533,797	14·82	603,857	15·96	66,362	15·94
Gresley	77,287	2·14	72,469	1·92	74,136	1·78
Major	....	....	....	....	....	....
Merredin	324,794	9·01	365,782	9·67	474,177	11·41
Nabawa	1,858,299	51·57	1,784,486	47·17	1,723,565	41·48
Noongaar	....	....	....	....	....	....
Queen's Fan	....	....	....	....	....	....
Ranee	....	....	....	....	....	....
Totadgin	....	....	....	....	....	....
Waratah	....	....	....	....	....	....
Yandilla King	121,243	3·37	117,699	3·11	136,004	3·27
Other Varieties	292,912	8·13	318,949	8·43	408,020	9·82
Total	3,603,265	100·00	3,782,828	100·00	4,154,814	100·00
Area for Grain	3,343,530	....	3,568,225	....	3,955,763	....

WHEAT VARIETIES IN WESTERN AUSTRALIA—*continued.*

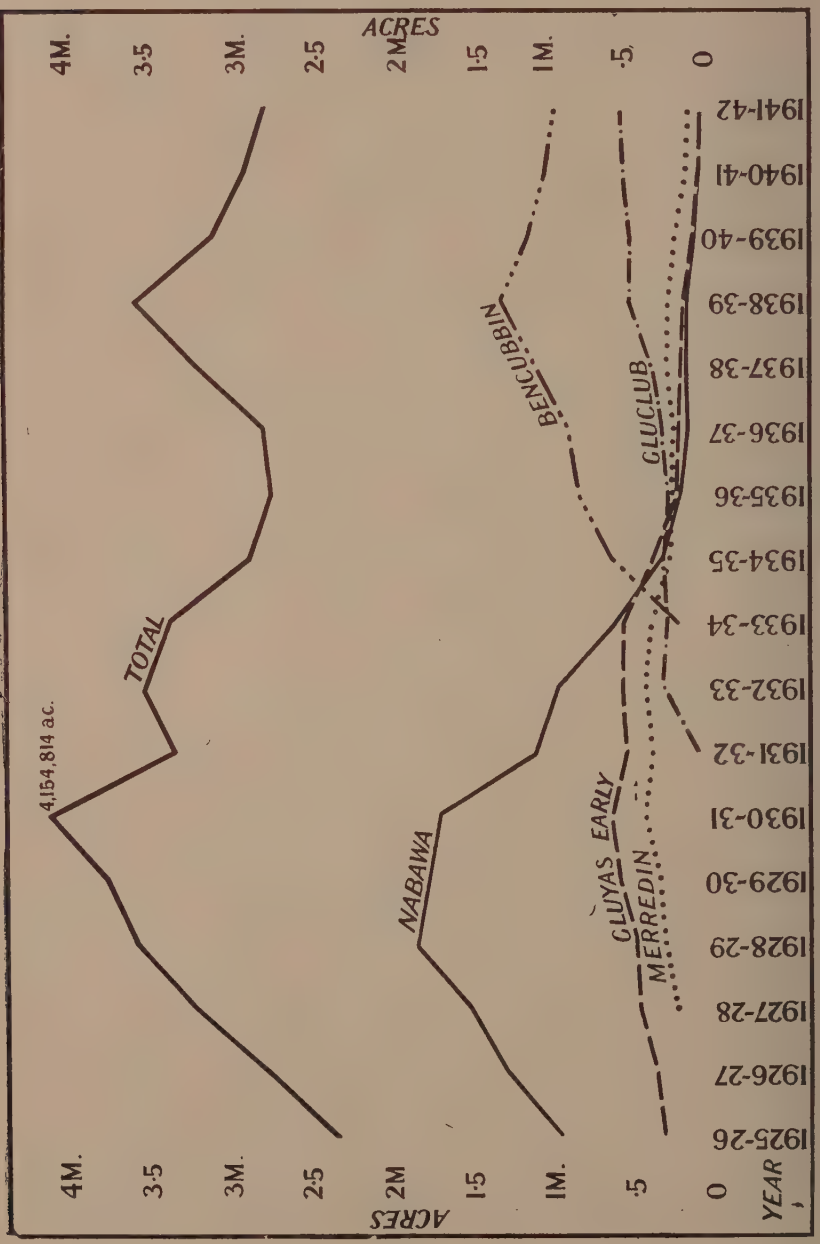
Variety.	Season. 1931–32.		1932–33.		1933–34.	
	acres.	%	acres.	%	acres.	%
Baroota Wonder	....	....	....	....	....	
Bena	114,367	3·40	151,357	4·24	141,319	4·15
Bencubbin	....	....	....	....	240,983	7·08
Canberra	76,879	2·29	77,021	2·16	78,755	2·31
Clubhead	73,702	2·19	....	....	....	
Dollar	....	....	....	....		
Dundee	....	....	....	....		
Federation	72,880	2·17	....	....	....	
Ford	81,594	2·42	117,135	3·29	120,376	3·54
Gallipoli	79,956	2·38	78,570	2·20	84,688	2·49
Geeralying	....	....	68,876	1·93	91,372	2·68
Gluclub	132,681	3·95	333,878	9·36	306,742	9·01
Gluyas Early	566,212	16·85	593,905	16·66	556,005	16·33
Gresley	....	....	....	....	....	....
Major	....	....	....	....	....	....
Merredin	412,220	12·26	459,262	12·88	412,992	12·13
Nabawa	1,099,928	32·73	982,631	27·56	625,849	18·38
Noongaar	89,317	2·66	145,081	4·07	196,070	5·76
Queen's Fan	....	....	....	....	....	....
Ranee	....	....	....	....	....	....
Totadgin	....	....	....	....	....	
Waratah	....	....	103,315	2·90	179,017	5·26
Yandilla King	91,628	2·73	64,187	1·80	....	
Other Varieties	469,576	13·97	390,386	10·95	370,740	10·89
Total	3,360,940	100·00	3,565,604	100·00	3,404,908	100·00
Area for Grain	3,158,888	....	3,389,352	....	3,183,216	

Variety.	Season. 1934–35.		1935–36.		1936–37.	
	acres.	%	acres.	%	acres.	%
Baroota Wonder	....	....	41,165	1·49		
Bena	98,464	3·39	58,283	2·11		
Bencubbin	654,417	22·51	847,715	30·70	891,374	31·91
Canberra	44,225	1·52	....	....		
Clubhead	....	....				
Dollar						
Dundee	....	....	....	....	....	
Federation	....	....	....	....	....	....
Ford	62,552	2·15	59,409	2·15	57,441	2·06
Gallipoli	53,575	1·84	45,455	1·65	39,461	1·41
Geeralying	63,409	2·18	48,813	1·77	46,157	1·65
Gluclub	319,467	10·99	305,200	11·05	334,745	11·98
Gluyas Early	384,880	13·24	253,365	9·18	231,918	8·30
Gresley	....	....	....	....		
Major	....	....	....	....	....	....
Merredin	314,362	10·81	287,744	10·42	274,257	9·82
Nabawa	330,365	11·36	230,855	8·36	176,483	6·32
Noongaar	168,039	5·78	130,793	4·74	158,396	5·67
Queen's Fan	....	....	....	....		
Ranee	....	....	....	....	....	
Totadgin	....	....	122,492	4·44	195,174	6·99
Waratah	122,111	4·20	98,667	3·57	87,529	3·13
Yandilla King	....	....	....	....		
Other Varieties	291,267	10·02	231,082	8·37	300,805	10·77
Total	2,907,133	100·00	2,761,038	100·00	2,793,740	100·00
Area for Grain	2,764,373	....	2,540,696	....	2,575,283	

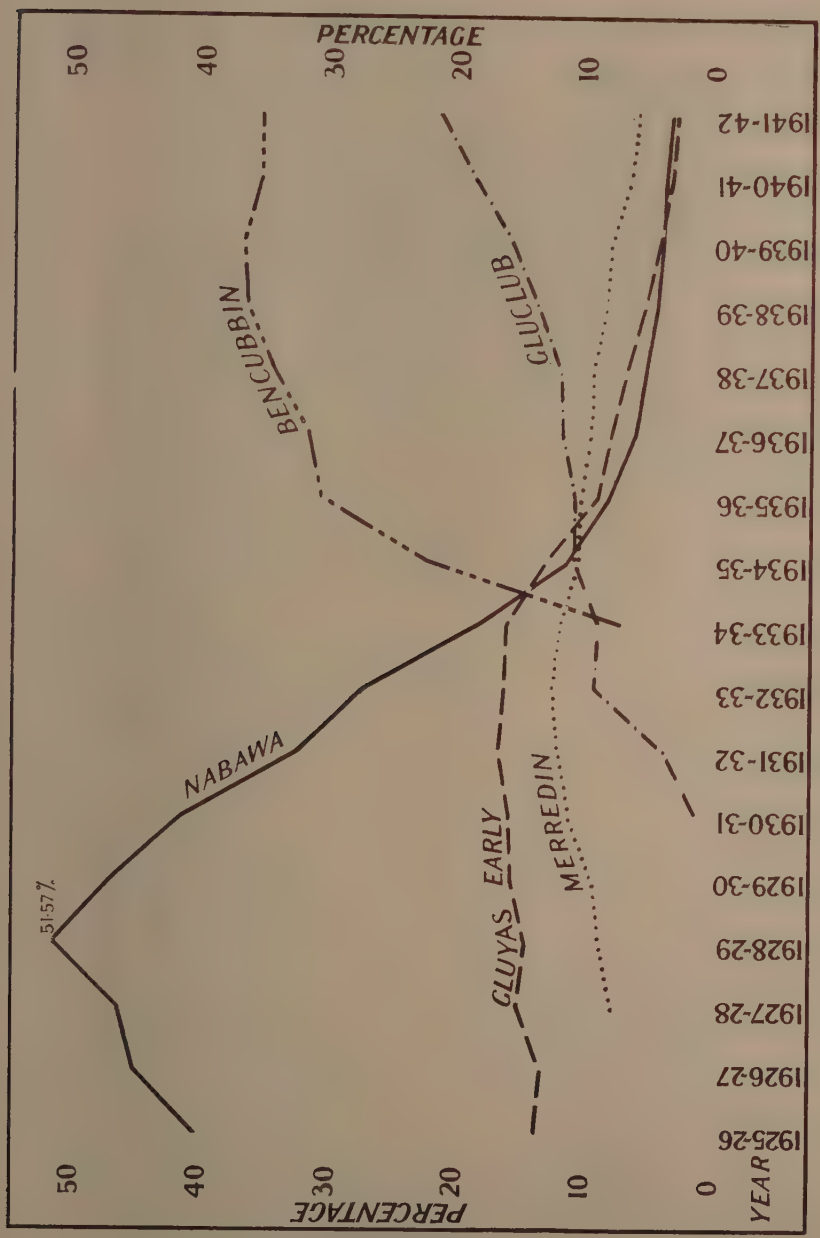
WHEAT VARIETIES IN WESTERN AUSTRALIA—*continued.*

Variety.	Season.					
	1937–38.		1938–39.		1939–40.	
	acres.	%	acres.	%	acres.	%
Baroota Wonder						
Bena						
Bencubbin	1,119,370	34·82	1,325,838	36·69	1,156,622	37·00
Canberra						
Clubhead						
Dollar						
Dundee	....	....	61,691	1·71	90,610	2·90
Federation						
Ford	54,757	1·70	64,595	1·79	47,849	1·53
Gallipoli	44,172	1·37	....	....	....	
Geeralying	46,835	1·46	56,965	1·58	....	
Gluclub	390,970	12·15	501,198	13·87	496,902	15·90
Gluyas Early	224,520	6·98	208,290	5·76	144,111	4·61
Gresley						
Major						
Merredin	309,518	9·63	310,964	8·61	261,206	8·36
Nabawa	179,341	5·58	172,263	4·77	132,574	4·24
Noongaar	173,942	5·41	197,913	5·48	170,387	5·45
Queen's Fan						
Ranee						
Totadgin	241,611	7·52	206,318	5·71	130,450	4·17
Waratah	89,591	2·79	83,076	2·30	66,502	2·13
Yandilla King	....	....	....	....	....	..
Other Varieties	340,309	10·59	424,236	11·74	363,029	11·61
Total	3,214,936	100·00	3,613,342	100·00	3,125,945	100·00
Area for Grain	3,026,420	....	3,412,818	....	2,970,411	

Variety.	Season.			
	1940–41.		1941–42.	
	acres.	%	acres.	%
Baroota Wonder	....	....	....	..
Bena	....	....	....	....
Bencubbin	1,042,884	35·69	998,564	35·62
Canberra	....	....	....	....
Clubhead	....	....	....	....
Dollar	....	....	....	....
Dundee	103,868	3·55	115,200	4·11
Federation	....	....	....	....
Ford	44,424	1·52	42,672	1·52
Gallipoli	....	....	....	..
Geeralying	....	....	....	....
Gluclub	556,224	19·04	579,405	20·67
Gluyas Early	109,016	3·73	85,443	3·05
Gresley	....	....	....	....
Major	....	....	....	....
Merredin	198,080	6·78	169,314	6·04
Nabawa	115,801	3·96	96,443	3·44
Noongaar	158,463	5·42	130,691	4·66
Queen's Fan	....	....	....	....
Ranee	96,953	3·32	120,290	4·29
Totadgin	85,837	2·94	65,304	2·33
Waratah	71,826	2·46	61,301	2·19
Yandilla King	....	....	..	....
Other Varieties	338,411	11·58	338,422	12·07
Total	2,921,787	100·00	2,803,049	100·00
Area for Grain	2,653,419	....	1,753,178	....



Graph showing the areas sown to the leading individual varieties of wheat in Western Australia for the seasons 1925-1926 to 1941-1942.



Graph showing the areas sown to the leading individual varieties of wheat in Western Australia expressed as percentages of the total area sown to wheat for the seasons 1925-1926 to 1941-1942.

The Vegetable Weevil.

(*Listroderes obliquus*. Klug.)

C. F. H. JENKINS, Government Entomologist.

The first record of the vegetable weevil, sometimes known locally as the carrot weevil, came from Brazil in 1829, and South America is believed to be its native home, but the pest has now been widely distributed over both the Americas and has gained a firm footing in Australia and South Africa. When it first reached Western Australia is unknown, but it was reported as a pest of tomatoes in Victoria as long ago as 1905. Actually the weevil has been established in Australia much longer than in North America, and at one time the insect was popularly known to American gardeners as the Australian tomato weevil..

Description.

The adult beetle is a typical weevil or snout beetle, having the head produced into a short proboscis, at the end of which the mouth parts are situated. It measures a little under half an inch in length, and the general colour is dull greyish-brown. Each wing cover near the tip has a rather faint grey mark, the two forming an inconspicuous V. Behind these light marks appear a pair of blunt spines or tubercles, one on each side.

Life History.

The vegetable weevil is active during the autumn, winter, and spring. The rounded yellowish-green eggs are laid in the soil at the base of the food plant or in the crown of such vegetables as carrots, parsnips and turnips. The time required for hatching varies greatly with weather conditions, but is usually between two and four weeks. The larva is a little over half an inch in length when full grown, and pale green in colour. It is rather slug-like in shape, being strongly convex on the upper and flat on the lower surface. It may take several weeks for the insect to become fully fed, after which it forms an earthern cell in the soil at a shallow depth and pupates. The pupal period varies from a fortnight to a month or more, according to weather conditions, but the main issue of adults takes place in the early spring.

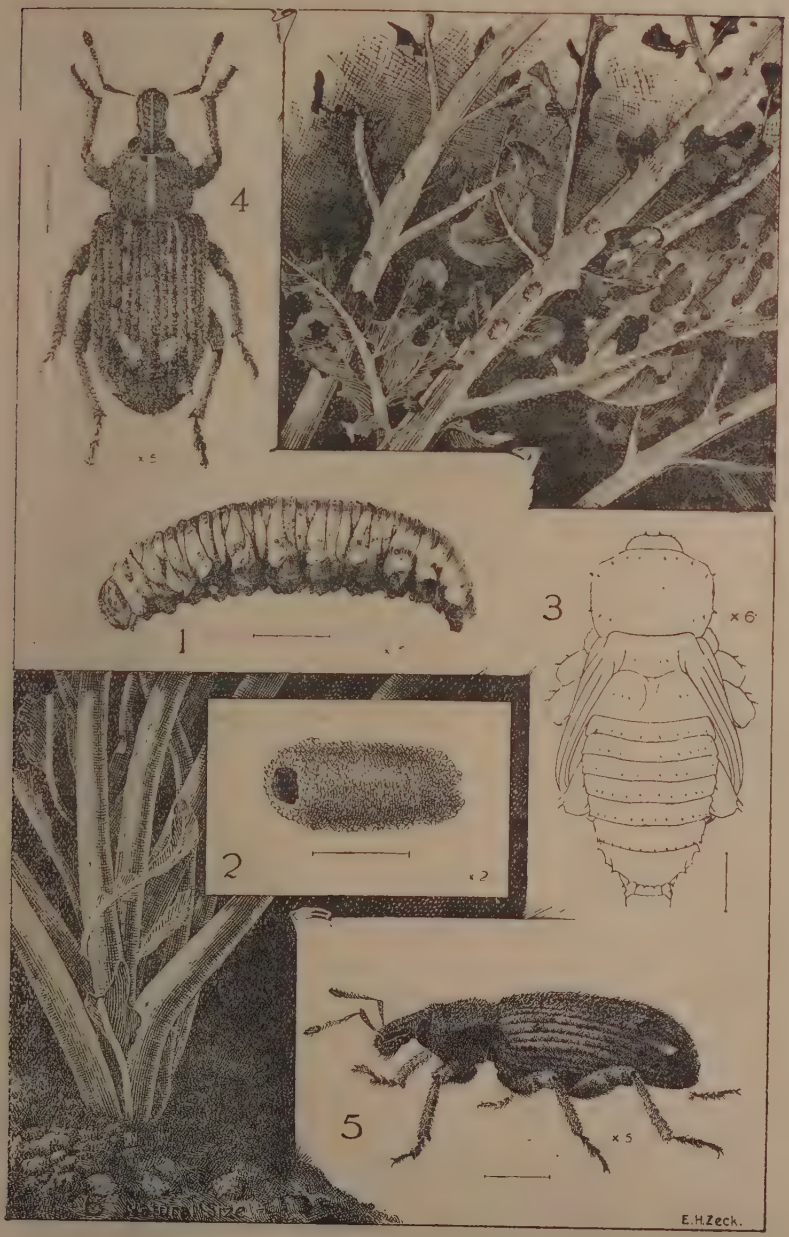
Habits.

Both the grubs and the adult weevils are destructive to vegetables. A full list of the plants attacked would be too long, but potatoes, tomatoes, and root crops are amongst the favourites. In addition, weeds such as capeweed and marsh mallows are often heavily infested.

The insects are usually nocturnal feeders and should be sought for under the soil at the base of the plants or in some sheltered position during the day time.

Not only is the foliage severely attacked, as will be seen from the injury shown in the illustration, but root vegetables may be extensively tunnelled. In the case of young plants the attack may sometimes be made at ground level, the stem being cut right through and the injury resembling very much that caused by cutworm.

The infestation of most vegetables may be expected practically throughout the winter, but peas and beans, also pumpkins, are relatively immune crops. With the advent of hot weather the adult weevils become inactive and remain dormant practically throughout the summer. The ability of the weevil to exist for long periods without food is demonstrated by the following experiment carried out by the United States Department of Agriculture in 1928. Beetles were confined in boxes without food and the time taken to starve to death was noted. The majority of weevils lived about three months but 8 per cent. lived 266 days, and one individual survived for 310 days.



The brown Vegetable weevil. 1. Larva. 2. Earthen pupal cell. 3. Pupa. 4. Adult weevil (dorsal view). 5. Adult weevil (side view). 6. Stem and leaves of potato damaged by weevils and larvae.

(N.S.W. *Agric. Gaz.*)

With a knowledge of its habits and resistance to starvation it is not difficult to understand how the weevil has become so widespread both in Australia and other parts of the world. The adult beetle is actually capable of flight, but this method of dispersal is probably relatively unimportant, since vegetables of practically all kinds have been found infested with weevil grubs when ready to take to market, and adult beetles could be quite easily transported in ship's stores.

Control.

Dusts and Sprays.—In many crops the pest may be successfully controlled by the application of poison dusts and sprays, but the matter is somewhat complicated where such vegetables as lettuce are attacked, as these, of course, should not be treated with poison or only when very young.

Formulae:—

(1) Arsenate of lead powder, 1 part.
Slaked lime, 1 part.

(2) Arsenate of lead powder, ½ ounce.
Water, 1 gallon.

On vegetables which are difficult to wet, some proprietary spreader or about an ounce of dried milk or flour mixed to a paste should be added to every gallon of the spray to increase its sticking properties.

(3) Pyrethrum, 1 part.
Kaolin, 1 part.

(4) Derris, 1 part.
Kaolin, 16 parts.

The two last formulae are almost entirely non-toxic to humans, and so may be applied to foliage which will be later used for food.

Poisoned Baits.—Where it is not desired to use dusts and sprays, or in conjunction with either of these treatments, poisoned baits may be used.

These baits are most effective against the newly-emerged adults and consist of either fresh vegetable material sprinkled with poison or poisoned bran and molasses. The following bait formulae are recommended:—

(1) 1 lb. sodium fluoride.
8 lbs. chopped fresh carrot or turnip, etc.

(2) 25 lbs. bran.
4 lbs. molasses.
1 lb. Paris green.
2½ gallons water.

The Paris green should be mixed dry with the bran and the mash prepared by gradually stirring in the water in which the molasses has already been dissolved. Where Paris green or sodium fluoride are not obtainable substitutes may be used in the above baits, but on account of the varying toxicity of different poisons the amounts required will differ.

The following alternatives may be used instead of the poisons mentioned above, and at the following strengths:—Sodium fluosilicate, ½ lb.; arsenite of soda, ½ lb. These materials may be dissolved in water before being added to the bran.

The baits should be liberally sprinkled around infested plants, preferably in the late afternoon, so that the material will be fresh and attractive when the insects commence feeding in the dusk.

Warning.—Care should be taken not to add too much water to the bran, otherwise the bait will not scatter freely. Lumpy bait is a potential danger to stock and poultry as long as the lumps remain.

Crop Rotation.—Where a heavy infestation of vegetable weevil has occurred, it is not advisable to replant that area with the same crop, or another equally

attractive one, as serious losses may occur. This practice of crop rotation or the alternating of susceptible and non-susceptible crops is widely used to control pests of all kinds. As already mentioned, peas, beans and pumpkins are a fairly safe crop to grow, neither does the beetle attack cereals.

Clean Cultivation.—Serious vegetable weevil outbreaks can often be traced to luxurious growth of weeds, especially capeweed and marsh mallows. Such plants should be cleared off the garden plot as soon as possible before planting, and care should be taken to see that headlands and adjacent areas are also kept clean of weeds.

Methods of Water Cooling Milk.

V. E. WESTON, Dairy Instructor.

One of the most effective means at the disposal of producers to prevent milk from undergoing fermentative changes is to cool it and keep it cool. The sooner this can be done after milking, the better. It is a fact that most of the bacteria that damage milk increase very slowly at temperatures below 50°F. but at higher temperatures they multiply rapidly. It is important, therefore, that an ample supply of cool clean water be available at the dairy and milking shed for cooling the milk. It is also necessary for washing-down purposes, and the cleaning of milking machines and dairy utensils.

Some farmers are not favourably placed in regard to water supplies or storage facilities and in consequence experience trouble with milk quality during the hot, dry summer months.

The following diagrams illustrate two arrangements in use by farmers to overcome water problems.

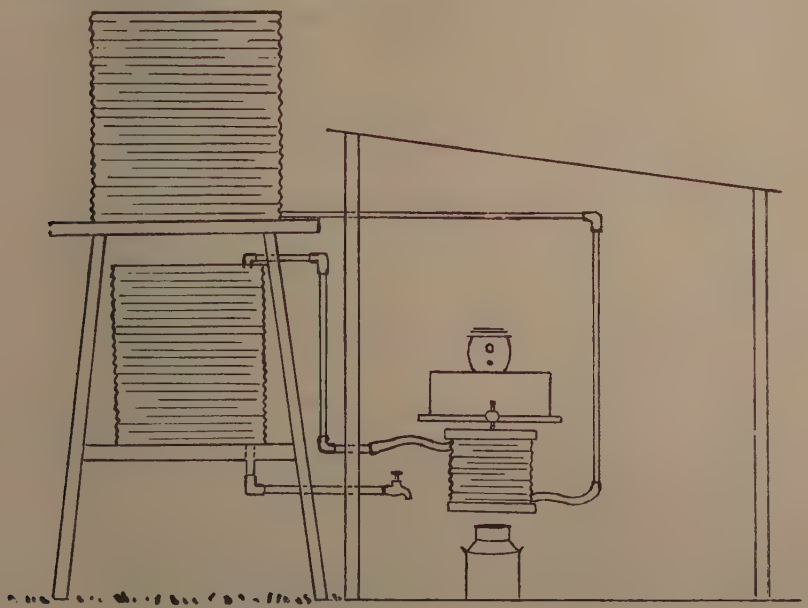


Fig. 1.

Figure I. shows a water storage tank on an overhead stand which is filled from a well pumped by the milking machine engine. From this tank the water gravitates to another smaller storage tank placed underneath or to a tank situated anywhere convenient, but below the level of the bottom of the high tank. The water on its way is directed through the milk cooler, and thus all water used for milk cooling is concerned. With the smaller tank raised about 4ft. from the ground the water can still be gravitated to the copper, wash-troughs and milking shed. This arrangement also saves engine fuel, and wear and tear, and in the case of windmill-power helps to tide over periods of windless days.

As it is desirable to keep the water as cool as possible for cooling milk during the summer months, pumping from the well should be done just before, or during the afternoon's milking, thus avoiding the water in the tank becoming warm with the heat of the sun. Where the engine horse-power is sufficient to drive the pump during milking it could be arranged to pump direct from the well, through the cooler and thence to a raised tank.

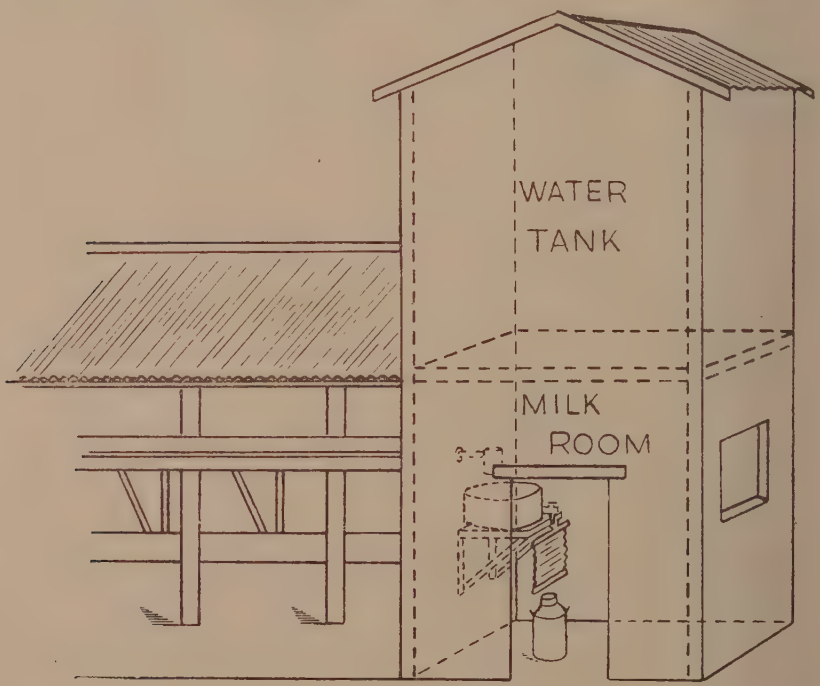


Fig. 2.

Figure II. shows an overhead tank with thick walls and roofed, which would also tend to keep the water cool. Where the roofing of the tank and the pumping of cool water just prior to use is not practical, then painting the outside of the tank white to reflect the sun's heat would help.

This is a novel method of arranging water storage with the advantages of cheapness of erection, permanency of materials, convenience of position, ample storage capacity and at the same time ensuring that the milk room is cool at all times.

It is simply that the walls and foundation of the milk room are used as a tank-stand and the ceiling of the room provides the bottom of the storage tank. The walls are continued upward to whatever height desired. The entire structure is made of reinforced concrete about 6in. thick. A tank 8ft. x 8ft. x 8ft. would hold just on 3,200 gallons of water.

Insecticides and Insecticide Rationing.

C. F. H. Jenkins, Government Entomologist.

Many agricultural problems have been greatly accentuated by wartime conditions and the matter of pest control is no exception. Even with adequate manpower and abundant supplies of material, losses due to insect pests are normally considerable, but with reduced labour and restricted insecticide supplies, the threat has been greatly increased, while the importance of the losses themselves has been further magnified by the need for maximum production on the land front.

Source of Supply.

As far as Western Australia is concerned the insecticide supply is influenced greatly by transport, as most of our materials come normally from abroad or from the Eastern States. Soon after the outbreak of hostilities the possibility of developing local supplies was carefully investigated, but it was shown that little relief from this source could be obtained for some time, and the necessity for very rigorous economy in the use of such staple materials as arsenate of lead and nicotine sulphate became obvious.

Necessity for Rationing.

In August, 1943, a system of rationing was instituted, requiring all users of arsenate of lead and nicotine sulphate to make application to the Department of Agriculture for a permit, at the same time furnishing details as to the area of the various crops under cultivation, the pests to be combated, and the stock of insecticides already held.

It was also necessary to introduce the principle of priorities, as it was soon apparent that even with careful distribution there would be insufficient material to supply all demands. The priorities laid down throughout the Commonwealth have been: —vegetable growing (1), animal health (2), and fruit production (3).

During the past fifteen months there has been a marked improvement upon the chaotic condition of insecticide dispersal prevailing before rationing was enforced, but unfortunately the supply position has not improved to a comparable degree.

This, combined with the greatly increased production targets in many priority crops, has led to the necessity for even more rigorous distribution control.

Nicotine Sulphate.

It is probable that the quantity of nicotine sulphate for stock and poultry purposes will be greatly reduced, and that more tedious substitutes will have to be used.

In the case of fruit pests only under very exceptional circumstances can an application receive favourable consideration until stocks improve.

Arsenate of Lead.

The arsenate of lead position, although far from satisfactory, is such that supplies can still be procured for the fruit grower as well as the market gardener,

but more use must be made of paste preparations in future owing to manufacturing difficulties connected with the production of the dust.

Arsenate of lead paste is just as efficient as the powder for the preparation of sprays, and so is better suited for the use of the orchardist than the vegetable grower. The latter usually applies the insecticide in a dry form on account of the necessity for repeated applications and the greater speed of treatment possible, but even vegetable growers may be forced to depart from their usual routine if the available proportions of arsenate of lead powder and paste cannot be satisfactorily balanced.

Despite the relative tediousness to the vegetable grower of spray treatments as opposed to dusting, in most instances the spray lacks nothing in efficiency and is very much more economical in the expenditure of material. The usual spray formula consists of ½ ounce of arsenate of lead powder, or 1 oz. of paste to one gallon of water. The reason for doubling the quantity of paste as compared with powder is that the former contains a high percentage of water, and so is less toxic than the powder weight for weight.

Many growers, especially orchardists, have sought to ensure adequate supplies by seeking permits in the winter for spray ingredients required in the following spring and summer. While normally this foresight is to be commended, under existing circumstances it is not possible to grant permits until just before the material is required, otherwise large quantities of insecticides may be lying idle while the more urgent and immediate requirements of the vegetable grower remain unsupplied.

Other Scarce Insecticides.

Nicotine sulphate and arsenate of lead are unfortunately not the only insecticides of which there is a shortage. Supplies of derris, Paris green, carbon bisulphide and pyrethrum, as well as other chemicals, have been seriously affected by war conditions. Ingredients containing derris are now covered by a National Security Regulation, and should only be sold for the purpose of treating vegetable crops. Up to the present it has not been considered necessary actually to issue permits to consumers as with the co-operation of distributors and users it was felt that correct distribution of the material could be achieved by less formal means. So far there has been no reason to doubt the satisfactory working of this arrangement, but should the privilege be abused at any time a strict permit system will have to be enforced.

Carbon Bisulphide.

Carbon bisulphide is a valuable fumigant which from time to time has proved very difficult to obtain in Western Australia. Transport difficulties and a lack of suitable containers, as well as an actual shortage of the material, have contributed to the local famine, but every effort is being made to see that the position is stabilised as soon as possible. One of the main insecticidal uses for carbon bisulphide in this State is the fumigation of seeds such as wheat, field peas, etc. For treatment of the latter against pea weevil there are no available substitutes, consequently the shortage is of particular importance to pea growers.

In this article it is not proposed to cover the whole insecticidal field, but to point out the causes which have led to some of our present shortages and the necessity for ensuring the most efficient distribution of such staple commodities as nicotine sulphate and arsenate of lead.

Such controls as have been enforced lead to a certain amount of unavoidable delay, and are at times irksome to all parties concerned. These defects are trivial, however, in comparison to the chaotic state which would exist should people be allowed to buy up and hoard stocks as they become available.

It is hoped then that growers will co-operate with the Department in its effort to obtain maximum results with the resources available by observing the following points: —

1. Seek advice from the Agricultural Department as to the most efficient method of controlling any particular pest.
2. Use all insecticides in as careful and efficient a manner as possible.
3. Use alternative sprays for nicotine and other materials in short supply where such are available.

The Official Australian Pure Bred Dairy Cattle Production Recording Scheme.

M. Cullity, Superintendent of Dairying, and B. H. Drakes, Recording Officer.

In reporting the results of testing of pure bred cows during the past year, it is necessary not only to give details of the yields of the individual cows, but also to indicate any features of interest which may appear.

Some breeders have attempted with success to show that their stock have high capacity for production, but it is an unfortunate fact that the performances of many cows are not equal to that achieved by a large number in grade herds. It is a matter which is commended to the earnest consideration of all pedigreed herd owners.

It is a well known fact that it is harder to improve a high quality herd than one whose production is very low. Owing to the policy adopted in this State of emphasising the need for prepotent sires from cows of high butterfat yield, the proportion of pure bred bulls in use throughout Western Australia is very high. Therefore it is disappointing that poor yields are obtained in the testing scheme, and if due to faulty breeding, such as the use of low quality dams, it is a grave disservice to the industry in this State. If, however, the poor yields are not due to breeding, but to faults in management and feeding, then the reputation of the breeder and to an extent the breed alone suffers.

While making these comments, it is necessary to make a distinction between those breeders who submit their herds for testing and those who do not. At the present time owing to the high prices which are being offered for dairy produce, there is a ready sale for all pure bred stock. In consequence, the owners who do not participate in the testing scheme are able to benefit from the demand created by the policy of the Department of Agriculture of emphasising the value of pure bred bulls from productive strains, the value of which has been demonstrated by the work of many progressive breeders who have built a reputation for themselves and their herds by breeding bulls which have played a very useful part in raising the quality of commercial herds.

The fact that over 50 per cent. of the pure bred animals submitted at a recent auction sale were from untested dams, indicates the degree at which reliance is being placed on breed not necessarily linked to performance.

Where low yields continue in herds after the use of high priced bulls, the farmer is likely to feel that the purchase of pure bred bulls is of no value. Those who have commercialised the current demand by breeding from pedigree cows irrespective of their yields will find that their reputations are not high. On the other hand those who submit their herds for test even though high yields are not

obtained, are at least demonstrating their desire to obtain information which will assist them in raising the general average quality of their cows.

One way in which the production of many pure bred herds can be improved immediately is by better feeding. The conservation of ample hay and silage and the proper use of concentrates would assist. The elimination of low producing cows is no less important, and it should be unnecessary to suggest that these should not be sold for inclusion in other stud herds.

There was no reduction in the number of herds submitted for testing during the year. In all, 21 herds with 315 cows were tested. Of the cows entered, 26 were withdrawn before completing 150 days, leaving 289 to be included in the calculation of the averages. In the previous year the number of herds submitted for test declined from 28 to 21. Present indications are that the greater number of the 21 tested during the past season will be re-submitted in the coming year.

The 289 cows which completed test averaged 311.57 lb. of butter-fat, which is 9.7 lb. lower than the average for 1942-43.

In view of the exceptionally dry season, the prevalence of bush fires and the consequent shortage of fodder, the result is considered satisfactory.

The average production for the cows tested during the past 10 years is shown in Table 1.

TABLE 1.

Year.	No. of Cows Completing Test.	Average Butter Fat per Cow.
		lbs.
1934–35	305	320·26
1935–36	367	297·17
1936–37	319	300·87
1937–38	333	298·08
1938–39	375	292·40
1939–40	382	305·88
1940–41	372	298·38
1941–42	290	322·84
1942–43	294	321·27
1943–44	289	311·57

In Table 2, it will be seen that there has been a further decrease in the percentage of cows passing standard, but this decline has been accentuated, particularly in the case of the Guernsey breed, where 15.8 per cent. fewer cows passed standard. The number of Shorthorns passing standard was 9.8 per cent. less than in the previous year. A very satisfactory increase in the performance of the Jersey cattle is disclosed, the number passing standard being 18.3 per cent. higher than in the previous testing period. This represents the greatest proportion of cows passing standard for this breed for very many years.

The number of cows passing standard in each age class is shown in Table 3. The performance of Jersey cows under test is also further demonstrated in that table and in the next.

In Table 3 it will be noted that particularly in the age classes Senior 2-years to Senior 4-years, the production of Jersey cows which have passed standard is high; in all, 44 cows were submitted in these classes and 37, or 84 per cent., surpassed standard production.

In Table 4 it is shown that, with the exception of the Junior 2-year-olds, the production of the Jersey cows in each age class was higher than the average production of the other two breeds.

TABLE 2.

PERCENTAGE OF COWS PASSING STANDARD.

Year.	Australian Illawarra Shorthorn.	Guernsey.	Jersey.	Total.
	%	%	%	%
1937-38	59·1	68·7	35·6	53·1
1938-39	53·8	71·4	55·2	57·9
1939-40	48·0	77·5	64·2	59·2
1940-41	52·0	61·0	51·0	54·0
1941-42	73·1	68·3	59·7	68·3
1942 43	67·6	67·9	55·0	64·3
1943 44	57·8	52·1	73·3	61·9

TABLE 3.

COWS PASSING STANDARD.

Age Class.	A.I.S.		Guernsey.		Jersey.		All Breeds.	
	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.	No. of Cows Tested.	No. Passing Standard.
Mature	28	10	27	12	17	10	72	32
Senior 4 years	12	4	5	3	7	5	24	12
Junior 4 years	7	5	6	2	7	6	20	13
Senior 3 years	14	8	5	3	9	8	28	19
Junior 3 years	12	3	10	6	11	9	33	18
Senior 2 years	19	15	8	3	10	9	37	27
Junior 2 years	36	29	10	8	29	19	75	56
Total	128	74	71	37	90	66	289	177
Percentage ...	57·8		52·1		73·3		61·2	

TABLE 4.

AVERAGE BUTTER FAT PRODUCTION IN EACH CLASS.

Age Class.	Standard.	A.I.S.		Guernsey.		Jersey.		All Breeds.	
		No. of Cows.	Average Butter Fat.	No. of Cows.	Average Butter Fat.	No. of Cows.	Average Butter Fat.	No. of Cows.	Average Butter Fat.
	lbs.		lbs.		lbs.		lbs.		lbs.
Mature	350	28	338·76	27	347·46	17	367·16	72	348·73
Senior 4 years ...	330	12	302·12	5	338·25	7	461·32	24	356·08
Junior 4 years ...	310	7	336·54	6	320·92	7	376·77	20	345·93
Senior 3 years ...	290	14	294·36	5	302·48	9	401·33	28	330·19
Junior 3 years ...	270	12	248·10	10	313·17	11	367·57	33	307·64
Senior 2 years ...	250	19	271·04	8	229·82	10	313·14	37	273·51
Junior 2 years ...	230	36	263·21	16	269·54	29	268·32	75	266·03
		128		71		90		289	

It was mentioned in last year's report that the yields obtained from the 2-year-old Jersey cows indicated that improved performance might be expected from this breed in future years. It is pleasing that this expressed opinion has been confirmed by the performances referred to above.

New Records.—Whilst some disappointment is felt at the low yields obtained in some herds, it is gratifying to record outstanding performances. The following new records were established during the year:—

Jersey.

Senior 4-year-old.—"Juadine Peerless Lily 13th" (owned by Miss L. G. Hancock, "Juadine," Harvey), produced 11,382 lb. of milk, average test 6.45 per cent. 734.47 lb. of butter-fat in 273 days, thus surpassing the previous record of 10,887 lb. milk, average test 6.07 per cent. 660.5 lb. butter-fat, established by "Banyule Silvermine 55th" in 1933. "Juadine Peerless Lily 13th" is by "Austral Park Wonderful Standard," which has been the leading bull in the pedigree herd recording scheme for the past two seasons.

The following records are now held by this cow:—

Senior 4-year-old class for all breeds, the Jersey breed and the Western Australian bred cow; Senior 3-year for the same classes.

Junior 4-year-old.—"Camden Circe" (owned by C. E. Kruger, of "Camden," Pinjarra), in 273 days produced 7,980 lb. milk, average test 6.65 per cent., 530.88 lb. butter-fat, thus passing by 109 lb. of butter-fat the record of 473 lb. established in 1935 by "Springmead Josephine." "Camden Circe" was sired by "Greenmount Golden Sultan" and her dam is "Camden Lady Fowler 2nd."

Junior 3-year-old.—"Camden Ariadne" (owned by C. E. Kruger, of "Camden," Pinjarra), in 273 days produced 7,980 lb. milk, average test 6.65 per cent., 530.88 lb. butter-fat, thus surpassing the record established by "Travalgan Lady Mint" of 527.91 lb. butter-fat. "Camden Ariadne" was sired by "Greenmount Golden Sultan" and her dam is "Greenmount Sweet Wonder."

Mr. Kruger's property is not irrigated and in view of the phenomenally dry conditions experienced during the past summer the performance of his two cows is of particular merit.

Junior 2-year-old.—"Grass Vale Topsy" (owned by R. H. Rose, "Grass Vale," Burekup) produced 8,121 lb. milk, average test 5.32 per cent., 425.13 lb. butter-fat. The previous holder of the record for this class was "Juadine Queen," which produced 6,789 lb. milk, average test 6.2 per cent., 421.64 lb. butter-fat. "Grass Vale Topsy" is by "Mornmoot Northwood Beau" from "Colmyn Topsy."

Guernsey.

Junior 3-year-old.—"Denmark Jonquil" (owned by the W.A. Government Denmark Research Station), in 273 days produced 8,812 lb. of milk, average test 5.72 per cent., 504.22 lb. butter-fat. This cow is from "Coogely Jonquil" and was sired by "Koojan Beau Ideal," which is a son of the imported American bull "Glenburnie Ideal." The performance is particularly pleasing in view of the exceptionally dry conditions experienced during the summer and autumn. The previous record for this class was held by another cow at the Denmark Research Station, "Denmark Golden Valencia 2nd," which yielded 9,096 lb. milk, average test 5.45 per cent., 496.14 lb. of butter-fat in 273 days.

It is interesting to recall that the herd at the Research Station is milked by machine and that stripping after milking was discontinued at the 31st March, 1941; neither of the record-establishing cows has ever been stripped.

The average production of daughters of four herd sires is shown in Table 5.

The production of all cows tested during the year is shown in Table 6.

TABLE 5.

AVERAGE PRODUCTION OF DAUGHTERS OF FOUR HERD SIRES.

Name of Bull.	Breed.	Sire.	Dam.	Average Production of Six Best Daughters.		Number of Daughters.	Average Production of All Daughters.	
				Without Allowances.	With Allowances.		Without Allowances.	With Allowances.
				Butter Fat lb.	Butter Fat lb.		Butter Fat lb.	Butter Fat lb.
Austral Park Wonderful Standard (12423)	Jersey	Ellerdale Wonderful Masterman (11561)	Ellerdale Wonder's Golden (47992)	506·01	544·71	7	485·70	533·43
Koojan Golden Prosper (2283)	Guernsey	Koojan Golden Governor (595)	Koojan Bonnie Jean (1612)	478·81	482·12	8	430·68	433·16
Grass Vale Gold Boy (14684) ...	Jersey	Belgonia Gold Boy (12458)	Grass Vale Lady Fowler 17th (48536)	430·00	462·15	8	400·28	441·05
Blacklands Jean's Supreme (1871)	A.I.S.	Fussy's Monarch of Hill View (493)	Jean 7th of Blacklands (7425)	415·97	429·09	11	344·43	367·89

TABLE 6.

COWS WHICH COMPLETED TEST DURING THE TWELVE MONTHS ENDED 30TH JUNE, 1944.

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test.	Weight of Milk for Period.	Average Test.	Weight of Butter Fat for Period.	Owner.	Sire.
						lb.	lb.	%	lb.		
COWS UNDER 2½ YEARS—STANDARD 230 LB. BUTTER FAT.											
Grass Vale Topsy	Jersey	86647	11-8-41	12 9 43	273	27	8,121	5·23	425·13	R. H. Rose	Mornmoot Northwood Beau (17798)
Grass Vale Buttercup 10th	do	86642	18-8-41	12 9-43	273	24	7,542	5·53	417·24	R. H. Rose	Mornmoot Northwood Beau (17798)
Denmark Golden Maria	Guernsey	8529	27- 6 40	19-10-42	273	22	7,176	5·55	398·82	Denmark Research Station	Denmark Damauric (4000)
Congelin Iolanthe 10th	Jersey		25-3-41	15-8 43	273	22	7,911	4·96	393·12	D. Bradford	Congelin Washington (18426)
Grass Vale Lady Fowler 35th	do.		1-3-42	10 10 43	273	21	6,693	5·73	383·89	R. H. Rose	Mornmoot Northwood Beau (17798)
Juadine Julienne 2nd	do.		26 2 41	17 6 43	273	13·5	5,425	6·70	363·88	Miss L. G. Hancock	Austral Park Wonderful Standard (12423)
Glanavon Rene	A.I.S.		4 12 40	21 10 42	273	26	8,028	4·40	353·94	D. Bevan & Sons	Tipperary President (5335)
Congelin Firefly 8th	Jersey		4-5 41	16 8-43	273	16	7,233	4·83	349·71	D. Bradford	Grantham Silvermine's Ruler (17539)
Grass Vale Lady Fowler 32nd	do.		11 6 41	9-6 43	273	16	5,988	5·68	340·34	R. H. Rose	Mornmoot Northwood Beau (17798)
Kapara Rosebud	do.		8-6-41	8-6-43	273	17·5	6,157	5·38	331·55	D. Bradford	Congelin Mandarin (14542)
Claremont Belle 28th	A.I.S.		15-1-41	2-7 43	273	25	8,175	3·96	324·36	Claremont Hospital for Insane	Westby Monarch (5404)
Glanavon Ettie 2nd	do		17-10-40	24-10 42	273	18	6,999	4·58	320·63	D. Bevan & Sons	Glanavon Gold's Final.
Muresk Lady Boniface	Guernsey	11067	23-4 41	24 9-43	273	12	6,036	5·30	320·33	Muresk Agricultural College	Denmark Damon (2519)
Congelin Sparkle 4th	Jersey		15 3 41	8-7 43	273	22	7,386	4·31	318·78	D. Bradford	Congelin Washington (18426)
Wooroloo Heather Bell	A.I.S.		28-7-40	1-1-43	273	25	7,575	4·18	317·31	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Narrogin Colleen	do.		22-8-41	13-6-43	273	11	7,553	4·18	316·16	Narrogin School of Agriculture	Westby Masterpiece (5403)
Wooroloo Netta 3rd	do.		6-12-40	4-5-43	273	16	7,338	4·27	313·86	Wooroloo Sanatorium Farm	Wooroloo Red Lad (5418)
Congelin Iolanthe 11th	Jersey		21 3-41	16 6 43	273	18·5	5,920	5·30	313·84	D. Bradford	Congelin Washington (18426)
Muresk Daltana	Guernsey	11060	22 3 41	8 9-43	273	13	6 279	4·87	306·28	Muresk Agricultural College	Denmark Damon (2519)
Glanavon Goldilocks 2nd	A.I.S.		4-12-40	15 10-42	273	22	7,596	3·98	302·80	D. Bevan & Sons	Tipperary President (5335)
Claremont Cherry 24th	do.		20-3-41	21-6-43	273	26	7,908	3·82	302·79	Claremont Hospital for Insane	Westby Monarch (5404)
Claremont Poppy 22nd	do.		14-2-41	22 5-43	273	24	7,152	4·22	302·22	Claremont Hospital for Insane	Westby Monarch (5404)
Claremont Hilda 12th	do.		15-7-41	28-9-43	273	21	7,083	4·22	299·04	Claremont Hospital for Insane	Claremont Pompous (4690)
Claremont Maggie Morrison 41st	do		2 10-40	26 1-43	273	25	7,575	3 90	296 12	Claremont Hospital for Insane	Westby Monarch (5404)
Denmark Ace's Dame	Guernsey		29-11-41	19-10-43	273	15	6,045	4 86	291·25	Denmark Research Station	Homestead Ace (imp. U.S.A.) (1631)
Claremont Whitby Maiden 2nd	A.I.S.		29 7 41	31 8 43	273	25	7,185	4 07	292·87	Claremont Hospital for Insane	Westby Monarch (5404)

Crantock Starbright Sunset	Jersey	...	2-4-41	15-6-43	240	8	5,340	5·45	291·39	Mrs. G. H. Burnside	Crantock Starbright's Airman (15491)
Claremont Beauty 22nd	A.I.S.		24-3-41	16-7-43	273	26	7,308	3·93	287·77	Claremont Hospital for Insane	Westby Monarch (5404)
Koojan Ideal's Jacqueline	Guernsey		14-3-41	10-1-43	273	15	5,055	5·60	283·53	A. W. Padbury	Glenburnie Ideal (imp. U.S.A.) (2548)
Wattle Creek Pansy 2nd	A.I.S.		24-4-41	23-5-43	273	19	6,687	4·17	279·35	E. T. Thatcher	Wattle Creek Duchess' Monarch (5399)
Tipperary Lovely 5th	do.		10-6-41	9-5-43	273	16	6,378	4·34	277·24	W. G. Burges	Tipperary Ace (6336)
Claremont Biddy 55th	do.		25-1-41	15-6-43	273	24	7,062	3·87	273·67	Claremont Hospital for Insane	Westby Monarch (5404)
Claremont Whitby Maid 44th	do.		6-6-41	22-8-43	273	23	6,999	3·89	272·86	Claremont Hospital for Insane	Westby Monarch (5404)
Travalgan Starbright 14th	Jersey	89349	18-5-41	12-5-43	273	12	4,491	5·95	267·39	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Claremont Blossom 36th	A.I.S.		31-1-41	5-6-43	273	17	6,591	4·02	265·24	Claremont Hospital for Insane	Claremont Max Hero (3802)
Narrogin Mavis	do.		27-5-41	22-6-43	273	17·5	7,597	3·45	262·65	Narrogin School of Agriculture	Westby Masterpiece (5403)
Wattle Creek Rosette	do.		30-7-41	26-8-43	273	20	6,420	4·08	262·05	E. T. Thatcher	Wattle Creek Duchess' Monarch (5399)
Claremont Cocky 18th	do.		22-8-40	15-11-42	273	25	6,765	3·81	257·97	Claremont Hospital for Insane	Westby Monarch (5404)
Tipperary Dove 18th	do.		8-8-41	31-5-43	273	12	6,366	4·04	257·55	W. G. Burges	Tipperary Ace (6336)
Narrogin Dolly	do.		20-8-41	6-7-43	240	11	5,955	4·31	256·86	Narrogin School of Agriculture	Westby Masterpiece (5403)
Radyr Park Clarionette 5th	Jersey		17-7-41	6-7-43	273	12	5,271	4·86	256·59	L. M. Temple	Navua September Lad (14023)
Crantock Master Princess	do.		28-7-41	6-6-43	240	12	5,136	4·94	253·95	Mrs. G. H. Burnside	Werribee David (18183)
Wooroloo Rose Marie 2nd	A.I.S.		15-12-40	28-3-43	273	13	5,709	4·43	253·01	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Radyr Park October Star	Jersey		18-10-41	31-8-43	273	7·5	4,272	5·91	252·74	L. M. Temple	Navua Coronation Star (14929)
Claremont Belle 29th	A.I.S.		9-6-41	6-8-43	273	17	6,261	3·96	247·98	Claremont Hospital for Insane	Westby Monarch (5404)
Tipperary Dove 17th	do.		26-3-41	8-5-43	273	12	6,006	4·09	246·14	W. G. Burges	Tipperary Ace (6336)
Travalgan Starbright 11th	Jersey		23-5-41	23-6-43	273	10	4,305	5·70	245·13	W. H. & T. F. Robinson	Orphanage Cuba (17913)
Travlagan Starbright 16th	do.		25-5-41	2-7-43	273	12	4,311	5·63	243·01	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Claremont Biddy 56th	A.I.S.		10-7-41	25-8-43	273	23	6,459	3·74	242·09	Claremont Hospital for Insane	Claremont Max Hero (3802)
Crantock Starbright Starette	Jersey		7-2-41	18-4-43	273	11	4,323	5·58	241·60	Mrs. G. H. Burnside	Crantock Starbright's Airman (15491)
Lansdowne Bonnie Jean 2nd	Guernsey	10707	12-6-41	11-8-43	273	7·5	4,402	5·40	238·05	P. G. Hampshire & Son	Koojan Beau Ideal (4965)
Crantock Cream Fancy	Jersey	...	27-4-41	24-8-43	180	12	4,560	5·18	236·39	Mrs. G. H. Burnside	Werribee David (18183)
Claremont Clara 16th	A.I.S.	....	28-5-41	17-8-43	273	16	5,658	4·14	234·34	Claremont Hospital for Insane	Westby Monarch (5404)
Maxwell Boronia	Guernsey	10858	8-7-41	7-9-43	240	8	3,795	6·17	234·33	P. Berridge	Moongi Oliver (1495)
Wattle Creek Marjorie	A.I.S.		30-7-41	26-8-43	273	16	5,778	4·01	231·92	E. T. Thatcher	Wattle Creek Duchess' Monarch (5399)
Travalgan Lady Eion 10th	Jersey		22-6-41	11-8-43	273	8	4,119	5·54	228·33	W. H. & T. F. Robinson	Orphanage Cuba (17913)
Crantock Starbright Hyacinth	do.		21-7-41	12-7-43	210	10	4,050	5·54	224·76	Mrs. G. H. Burnside	Crantock Starbright's Airman (15491)
Narrogin Pixie	A.I.S.		29-3-41	21-4-43	273	18	5,514	3·95	218·15	Narrogin School of Agriculture	Westby Masterpiece (5403)

HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test.	Weight of Milk for Period.	Average Test.	Weight of Butter Fat for Period.	Owner.	Sire.
						lb.	lb.	%	lb.		
COWS UNDER 2½ YEARS—STANDARD 230 LB. BUTTER FAT—*continued.*											
Crantock Master Diva	Jersey	...	28–7–41	8–5–43	240	10	4,485	4·80	215·34	Mrs. G. H. Burnside .	Werribee David (18183)
Glanavon Buttercup 4th	A.I.S.	....	12–10–40	3–11–42	273	10	4,590	4·66	214·14	D. Bevan & Sons .	Parkview Commodore (306)
Glanavon Nancy 6th	do.	....	9–4–41	14–9–43	273	5	5,355	3·99	214·13	D. Bevan & Sons	Glanavon Golden Boy (4830)
Brookfields Clarette	Guernsey	10061	15–11–41	22–10–43	273	9	3,702	5·78	214·02	P. G. Hampshire & Son	Yarraview Clarinet (4628)
Denmark Lady Diana	do.	8537	26–6–40	3–11–42	273	6	3,498	6·00	210·18	Denmark Research Station	Denmark Damaurie (4000)
Tipperary Peggy 2nd	A.I.S.	....	10–7–41	3–6–43	273	9	4,947	4·15	205·37	W. G. Burges ..	Tipperary Ace (6336)
Camden Snow White	Jersey	85545	21–11–40	25–3–43	180	14·5	3,060	6·61	202·32	C. E. Kruger	Greenmount Golden Sultan (14688)
Narrogin Primrose	A.I.S.	....	25–3–41	25–4–43	273	17·5	5,407	3·72	201·33	Narrogin School of Agriculture	Westby Masterpiece (5403)
Brookfields Queen 10th	Guernsey	10078	19–11–41	7–10–43	273	8	3,939	4·96	195·63	P. G. Hampshire & Son	Yarraview Clarinet (4628)
Travalgan Lady Eion 9th	Jersey	....	24–6–41	1–7–43	273	7	3,321	5·81	193·03	W. H. & T. F. Robinson	Orphanage Cuba (17913)
Radyr Park Dorothy 15th	do.	....	26–6–41	28–3–43	273	10	4,005	4·67	187·17	L. M. Temple .	Navua September Lad (14023)
Camden Tinkle 2nd	do.	85546	2–7–41	22–4–43	180	12·5	3,150	5·77	181·77	C. E. Kruger ..	Greenmount Golden Bobbie (18578)
Wooroloo Iona	A.I.S.	..	20 12–40	23–3–43	210	14	3,930	4·40	173·04	Wooroloo Sanatorium Farm	Wooroloo Triumph's Heir
Radyr Park Dorothy 7th ..	Jersey	88644	21–6–41	28–6–43	150	19	3,255	5·19	169·14	L. M. Temple	Navua September Lad (14023)
Crantock Starbright's Bluebell	do.	....	22–3–41	22–6–43	210	7	2,940	5·41	159·42	Mrs. G. H. Burnside	Crantock Starbright's Airman (15491)
Glanavon Dell 5th	A.I.S.	....	17–7–41	4–8–43	90	32	3,630	3·71	134·76	D. Bevan & Sons ..	Tipperary President (5335)
Glanavon Dahlia	do.	...	3–5–41	27–5–43	120	19·5	2,685	4·18	112·29	D. Bevan & Sons ..	Westby Masterpiece (5403)
Tipperary Beauty 13th ..	do.	....	23–1–41	15–6–43	150	10	2,430	4·06	98·82	W. G. Burges .	Blacklands Monarch's Commander (1877)
Camden Silver Bell	Jersey	....	16–1–42	31–3–43	150	9	1,905	4·94	94·20	C. E. Kruger	Greenmount Golden Sultan (14688)
Brookfields Faith 9th	Guernsey	10067	28–9–41	12–12–43	120	10	1,890	4·80	90·78	P. G. Hampshire & Son	Yarraview Clarinet 2nd (4629)
Glanavon Florrie 4th	A.I.S.	....	13–9–41	4–10–43	90	23	2,190	4·08	89·40	D. Bevan & Sons ..	Newstead Triumph (3420)
Claremont Treasure 26th	do.	...	14–1–41	7–5–43	90	22	2,070	3·93	81·36	Claremont Hospital for Insane	Wooroloo Triumph 4th (3627)
Glanavon Tiny 11th	do.	....	3–5–41	25–9–43	60	34	2,100	3·64	76·47	D. Bevan & Sons ..	Blacklands Monarch's Commander (1877)
Radyr Park Dorothy 18th	Jersey	....	3–6–42	29–3–44	30	14·5	435	6·91	30·06	L. M. Temple	Navua Coronation Star (14929)
Claremont Treasure 28th ..	A.I.S.	..	14–7–41	20–9–43	30	22	660	3·75	24·75	Claremont Hospital for Insane	Claremont Pompous (4690)
COWS 2½ YEARS AND UNDER 3 YEARS—STANDARD 250 LB. BUTTER FAT.											
Kapara Sparkle's Lassie	Jersey	82173	22–8–40	11–4–43	273	22	7,611	5·42	413·18	D. Bradford	Congelin V. C. (16412)
Congelin Happy Days 3rd....	do.	85704	1–2–41	17–8–43	273	21·5	7,324	4·95	362·82	D. Bradford	Congelin Washington (18426)
Travalgan Lady Eion 8th .	do.	84258	19–9–40	11–7–43	273	14	5,892	5·56	327·58	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Grass Vale Golden Cream 24th	do.	81628	14–10–40	1–10–43	240	14	5,280	6·06	320·19	R. H. Rose . . .	Grass Vale Gold Boy (14684)

Tipperary Beauty 9th	A.I.S.	....	21-2-40	27-11-42	273	14	7,212	4·44	317·62	W. G. Burges	Blacklands Monarch's Commander (1877)
Muresk Morning Glory	Guernsey	9111	2-5-40	30-4-43	273	14	5,232	6·01	314·74	Muresk Agricultural College	Muresk Arthur (4338)
Crantock Starbright Primula	Jersey	80888	12-1-40	10-12-42	273	13	5,310	5·89	313·76	Mrs. G. H. Burnside ..	Crantock Starbright Airman (15491)
Glanavon Fairy 5th	A.I.S.	....	25-8-40	24-10-42	273	20	7,440	4·11	306·32	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Grass Vale Golden Cream 21st	Jersey	86643	16-6-40	24-2-43	273	18	5,124	5·89	301·86	R. H. Rose	Grass Vale Gold Boy (14684)
Glanavon Goldilocks 2nd	A.I.S.	....	4-12-40	22 9-43	240	8	7,740	3·89	301·36	D. Bevan & Sons	Tipperary President (5335)
Wooroloo Pidgeon	do.	....	20-9-40	30 3 43	273	20	6,960	4·24	295·33	Wooroloo Sanatorium Farm	Wooroloo Triumph's Heir
Camden Cleo 2nd	Jersey	85540	1-6-40	6-1-43	240	21·5	5,505	5·35	295·02	C. E. Kruger	Greenmount Golden Sultan (14688)
Claremont Star 24th	A.I.S.	...	20-8-40	6-5-43	273	22	7,206	4·05	292·36	Claremont Hospital for Insane	Westby Monarch (5404)
Tipperary Maggie 7th ...	do.	...	22-8-40	7-7-43	273	17	7,041	4·08	287·69	W. G. Burges	Liberton Venturer (4988)
Claremont Whitby Maid 43rd	do.	....	26-7-40	15-5 43	273	25	7,155	3·93	281·47	Claremont Hospital for Insane	Claremont Max Hero (3802)
Camden Diana	Jersey	85541	10-9-40	7-7-43	150	30	5,475	5·09	278·97	C. E. Kruger	Greenmount Golden Sultan (14688)
Wooroloo Cherry	A.I.S.	....	28-7-40	30 3-43	273	18	6,654	4·19	278·91	Wooroloo Sanatorium Farm	Wooroloo Red Lad (5418)
Narrogin Daisybell	do.	.	10-10-40	13-5-43	273	12	6,141	4·44	273·08	Narrogin School of Agriculture	Westby Masterpiece (5403)
Narrogin Mollie	do.	...	22-4-40	4 4-43	273	22·5	6,967	3·91	272·82	Narrogin School of Agriculture	Westby Masterpiece (5403)
Claremont Fancy 10th ..	do.	...	20-10-40	19-6-43	273	23	6,849	3·97	272·18	Claremont Hospital for Insane	Westby Monarch (5404)
Claremont Cherry 22nd . .	do.	..	9-10-40	22-5-43	273	21	6,483	4·19	272·09	Claremont Hospital for Insane	Westby Monarch (5404)
Congelin Velveteen 2nd ...	Jersey	80831	19-7-40	2 5-43	273	4	5,367	5·03	270·22	D. Bradford ..	Rosecliffe Marchalong (15094)
Glanavon Melba 3rd	A.I.S.	...	11-11-40	17-8-43	210	16	6,480	4·11	266·52	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Wooroloo Bess 2nd	do.	....	9-8-40	6-3-43	273	16	6,243	4·22	264·04	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Muresk Netta	Guernsey	11071	27-11-40	16-8-43	273	12·5	4,762	5·33	253·88	Muresk Agricultural College	Muresk Homestead (2075)
Brookfields Bettina	do.	10058	3-8-40	8-3-43	273	14	5,097	4·96	253·16	P. G. Hampshire & Son	Yarraview Clarinet 2nd (4629)
Claremont Poppy 21st	A.I.S.	....	30-9-40	5-6-43	273	22	6,486	3·89	252·90	Claremont Hospital for Insane	Claremont Max Hero (3802)
Denmark Briarette	Guernsey	10288	24-9-40	14 8-43	273	6	4,458	5·56	248·27	Denmark Research Station	Koojan Ideal's Dictator (4167)
Kapara Sparkles Victorious	Jersey	82074	16-7-40	4-6-43	273	12	5,106	4·85	247·85	D. Bradford	Rosecliffe Marchalong (15094)
Brookfields Queen 7th ...	Guernsey	8391	23-6-40	10-5-43	273	9·5	4,363	5·59	244·25	P. G. Hampshire & Son	Yarraview Clarinet 2nd (4629)
Wooroloo Polly	A.I.S.	..	15-6-40	15-1-43	273	13	4,989	4·85	242·23	Wooroloo Sanatorium Farm	Wooroloo Red Lad (5418)
Glanavon Picture 5th	do.	. .	30-10-40	13-7-43	273	10	5,670	4·18	237·29	D. Bevan & Sons	Parkview Commodore (306)
Glanavon Vida 4th	do.		16-9-40	7-6-43	240	8	6,000	3·90	234·33	Burkitt & Brown	Tipperary President (5335)
Maxwell Miss Reformer ...	Guernsey	10859	1-7-40	24-4 43	240	9	3,900	5·52	215·52	P. Berridge	Moongi Oliver (1495)
Yokanup Carnation . ..	A.I.S.		24-7-40	2 7-43	240	5	5,520	3·64	201·21	Burkitt & Brown	Summerlea Doncaster (6237)
Muresk Ramona ..	Guernsey	9112	13-5-40	12 5-43	273	12	3,786	5·21	197·63	Muresk Agricultural College	Muresk Homestead (2075)
Congelin Bess	Jersey	80827	29-9-40	6-6-43	120	26·5	3,135	3·96	124·11	D. Bradford	Clarendon Eyre Golden Oxford (13606)
Brookfields Judy ..	Guernsey	10070	19-1-41	15-11-43	150	3·5	2,180	5·09	111·12	P. G. Hampshire & Son	Brookfields Baron (3936)
Maxwell Orchid	do.	10860	15-5-41	8-3-44	60	18	1,080	5·20	56·16	P. Berridge	Moongi Oliver (1495)
Muresk Aura	do.	11059	9-8-40	6-7-43	60	10	840	5·21	43·80	Muresk Agricultural College	Muresk Arthur (4338)

HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk of Last Day of Test.	Weight of Milk for Period.	Average Test.	Weight of Butter Fat for Period.	Owner	Sire.
COWS 2½ YEARS AND UNDER 3 YEARS—STANDARD 250 LB. BUTTER FAT—*continued.*						lb.	lb.	%	lb.		
Glanavon Sunbeam	A.I.S.		30-10-40	16-10-43	30	35	1,050	3·91	41·10	D. Bevan & Sons	Parkview Commodore (306)
Brookfields Faith 7th	Guernsey	10065	25-6-41	8-2-44	60	11	885	4·58	40·62	P. G. Hampshire & Son	Yarraview Clarinet 2nd (4629)
COWS 3 YEARS AND UNDER 3½ YEARS—STANDARD 270 LB. BUTTER FAT.											
Camden Ariadne	Jersey	85538	10-8-40	6-9-43	273	20	7,980	6·65	530·88	C. E. Kruger	Greenmount Golden Sultan (14688)
Denmark Jonquil	Guernsey	8536	24-4-40	24-8-43	273	12·5	8,812	5·72	504·22	Denmark Research Station	Koojan Beau Ideal (4965)
Denmark Golden Valencia 2nd	do.	8535	15-9-39	20-11-42	273	17	9,096	5·45	496·14	Denmark Research Station	Koojan Ace's Goldseeker (3431)
Congelin Iolanthe 8th	Jersey	80828	22-4-40	7-5-43	273	20·5	8,461	5·27	446·59	D. Bradford	Rosecliffe Marchalong (15094)
Denmark Anna	Guernsey	8524	24-9-39	21-11-42	273	15	7,245	5·81	421·51	Denmark Research Station	Koojan Ace's Goldseeker (3431)
Juadine Julienne	Jersey	87020	2-3-40	24-8-43	273	14	7,407	5·43	402·82	Miss L. G. Hancock	Austral Park Wonderful Standard (12423)
Congelin Rose Marie 6th	do.	80830	14-4-40	14-5-43	273	18	6,629	5·92	392·71	D. Bradford	Rosecliffe Marchalong (15094)
Juadine Peerless Lily 17th	do	81991	18-12-39	26-5-43	273	13·5	5,965	6·35	379·32	Miss L. G. Hancock	Austral Park Wonderful Standard (12423)
Travalgan Lady Eton 7th	do.	89345	22-6-40	3-6-43	273	14	6,342	5·95	377·93	W. H. & T. F. Robinson	Travalgan Northern Airman (13312)
Grass Vale Golden Cream 22nd	do.	81626	18-6-40	9-10-43	273	16	6,348	5·71	362·70	R. H. Rose	Grass Vale Gold Boy (14684)
Denmark Golden Valencia	Guernsey	8534	15-9-39	15-2-43	273	21	7,383	4·81	355·18	Denmark Research Station	Koojan Ace's Goldseeker (3431)
Glanavon Topsy	A.I.S.		27-9-39	5-3-43	273	21	9,063	3·90	353·97	D. Bevan & Sons	Tipperary President (5335)
Travalgan Starbright 9th	Jersey	84259	23-5-40	19-6-43	273	15	6,030	5·86	353·66	W. H. & T. F. Robinson	Travalgan Northern Airman (13312)
Travalgan Starbright 13th	do.	84260	6-6-40	17-6-43	273	14	6,447	5·45	351·76	W. H. & T. F. Robinson	Travalgan Northern Airman (13312)
Glanavon Empress 4th	A.I.S.		24-7-40	12-9-43	273	8	8,124	3·89	316·55	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Maxwell Queen Ann	Guernsey	10861	29-5-40	6-9-43	273	11	4,698	6·59	309·81	P. Berridge	Moongi Oliver (1495)
Narrogin Charlotte	A.I.S.		13-4-40	7-8-43	273	12	8,181	3·67	300·71	Narrogin School of Agriculture	Westby Masterpiece (5403)
Denmark Golden Dawn 2nd	Guernsey	8527	2-4-40	17-7-43	273	9	4,587	6·11	280·62	Denmark Research Station	Koojan Ace's Goldseeker (3431)
Muresk Delicia	do.	9106	15-5-40	12-6-43	273	8	5,364	4·92	264·08	Muresk Agricultural College	Denmark Damon (2519)
Crantock Starbright's Reminder	Jersey	85802	21-6-40	30-7-43	210	9	4,800	5·49	263·52	Mrs. G. H. Burnside	Crantock Starbright's Airman (15491)
Glanavon Florrie 2nd	A.I.S.		4-5-40	7-9-43	273	13	5,799	4·25	246·76	E. T. Thatcher	Blacklands Jean's Supreme (1871)
Tipperary Dove 14th	do.		22-3-40	11-5-43	273	7	5,661	4·25	240·80	W. G. Burges	Liberton Venturer (4988)
Westby Lupin 18th	do.		27-9-39	16-3-43	273	11	6,078	3·83	233·14	Burkitt & Brown	Westby Monarch (5404)

Glanavon Rose 2nd	do.	....	13-11-39	10-4 43	273	8	5,514	4·21	232·43	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Wooroloo Golden Girl	do.	....	27-6-39	7-11-42	210	7	5,490	4·20	230·64	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Wooroloo Mary 3rd	do.	33995	15-12-39	28 4-43	273	8	4,944	4·61	227·92	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Wattle Creek Spangle	do.	..	15-3-40	11-5-43	273	10	5,160	4·16	214·68	E. T. Thatcher	Wattle Creek Duchess' Monarch (5399)
Lansdowne Lady	Guernsey	10721	3-7-40	11-11-43	120	23	3,570	5·99	213·93	A. W. Padbury	Koojan Beau Ideal (4965)
Tipperary Beauty 11th	A.I.S.	....	20-9-40	12-10-43	240	8	4,770	4·25	200·61	W. G. Burges	Liberton Venturer (4988)
Maxwell Red Rose 2nd	Guernsey	10863	23 6 40	9-9-43	150	10	3,210	5·79	185·91	P. Berridge	Moongi Oliver (1495)
Crantock Nobel Bell	Jersey	85800	11-8 40	29-8-43	180	10	3,600	5·03	181·38	Mrs. G. R. Burnside	Crantock Eminent Noble (17405)
Muresk Madam Fay	Guernsey	9109	3-5-40	8-7-43	150	15	4,680	3·82	179·01	D. Bevan & Sons	Glanavon Franklin (4829)
Brookfields Bonny	do.	8378	3-3-40	9-8-43	90	15	1,935	4·86	94·20	P. G. Hampshire & Son	Denmark Damon (2519)
Tipperary Lovely 4th	A.I.S.	....	29-6-40	31-8-43	90	14	2,070	3·83	79·41	W. G. Burges	Yarraview Clarinet 2nd (4629)
Maxwell Red Letter	Guernsey	10862	7 6-40	14 6-43	60	9	660	5·73	37·83	P. Berridge	Blacklands Monarch's Commander (1877)

COWS 3½ YEARS AND UNDER 4 YEARS—STANDARD—290 Lp. BUTTER FAT.

Juadine Peerless Lily 16th	Jersey	81990	20-9 39	6-6-43	273	26	8,868	5·76	511·09	Miss L. G. Hancock	Austral Park Wonderful Standard (12423)
Camden Arachne	do.	80635	9-9-39	24-6-43	273	19·5	7,978	6·02	480·78	C. E. Kruger	Greenmount Golden Sultan (14688)
Grass Vale Golden Maggie	do.	81629	5-10 39	9-10-43	273	23	8,229	5·50	452·98	R. H. Rose	Grass Vale Gold Boy (14684)
Crantock Golden Juliet	do.	85797	30-4-39	10-4 43	273	22	8,226	5·37	442·11	Mrs. G. H. Burnside	Congelin Eminent's Golden (13623)
Camden Patsy	do.	85543	27 6-39	15-6-43	273	16·5	6,949	6·22	432·91	C. E. Kruger	Greenmount Golden Sultan (14688)
Glanavon Maggie	A.I.S.	....	7 8-39	17 3-43	273	17	9,471	3·87	367·17	D. Bevan & Sons	Tipperary President (5335)
Rapara Sparkle 3rd	Jersey	77064	21 7 39	14 5 43	273	16·5	6,529	5·52	360·78	D. Bradford	Congelin Mandarin (14542)
Wattle Creek Gold	A.I.S.	....	9-2-40	26-8 43	273	16	8,538	4·07	348·12	E. T. Thatcher	Wattle Creek Duchess' Monarch (5399)
Radyr Park Dorothy 10th	Jersey	83556	4-7-39	8 3-43	273	17	7,566	4·52	342·46	L. M. Temple	Navua Coronation Star (14929)
Glanavon Vida 3rd	A.I.S.	30609	19 5 39	10-4 43	273	6	8,658	3·95	342·13	Burkitt & Brown	Parkview Commodore (306)
Wooroloo Doreen 3rd	do.	....	18 3-39	5-3-43	273	16	7,818	4·32	338·18	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Lansdown Cream Lady	Guernsey	8826	3-10-39	22-7-43	273	5	5,295	6·34	336·23	P. G. Hampshire & Son	Koojan Ideal's Benefactor (4165)
Wooroloo Dawn 2nd	A.I.S.	..	9-10-39	26-5-43	273	18	7,674	4·33	332·92	Wooroloo Sanatorium Farm	Wooroloo Red Lad (5418)
Narrogin Donna	do.	32144	27 10 39	29 7 43	240	13·5	7,635	4·31	329·52	Narrogin School of Agriculture	Westby Masterpiece (5403)
Muresk Sunbeam	Guernsey	9117	30-11 39	21 7-43	273	16·5	6,034	5 42	327·09	Muresk Agricultural College	Muresk Homestead (2075)
Camden Chimes	Jersey	80636	25-5 39	9-4-43	180	29	5,340	5·91	316·11	C. E. Kruger	Greenmount Golden Sultan (14688)
Tipperary Beauty 9th	A.I.S.	....	21-2-40	13-10-43	273	10	7,290	4·12	300·58	W. G. Burges	Blacklands Monarch Commander (1877)
Wooroloo Wendy 4th	do.		14-9-39	21-3-43	273	17	6,381	4·65	296 90	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Muresk Golden Pearl	Guernsey	9107	9-10-39	12-7-43	273	16	5,568	5 23	291 61	Muresk Agricultural College	Muresk Homestead (2075)
Brookfields Queen 6th	do.	8390	2-3-39	10-12-43	273	12	6,021	4 80	289 50	P. G. Hampshire & Son	Brookfields Baron (3936)
Yanget Pretty Maid 4th	A.I.S.	34035	7-10-39	19-6-43	273	10	6,720	4 17	280 34	W. G. Burges	Leylands Defiance (2380)
Radyr Park Coronation's Estreliita	Jersey	83555	27-7-39	27-6-43	273	10	5,445	5 00	272·77	L. M. Temple	Navua Coronation Star (14929)
Wooroloo Lilac 2nd	A.I.S.	..	18-12-39	6-8-43	273	6	6,078	4·42	269·17	Wooroloo Sanatorium Farm	Wooroloo Triumph's Heir

HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test.	Weight of Milk for Period.	Average Test.	Weight of Butter Fat for Period.	Owner.	Sire.
						lb.	lb.	%	lb.		
COWS 3½ YEARS AND UNDER 4 YEARS—STANDARD 290 LB. BUTTER FAT—*continued.*											
Westby Carnation 5th	A.I.S.	....	25-6-39	15-2-43	273	26	7,113	3·77	268·48	Burkitt & Brown	Westby Star (5406)
Muresk Angelica	Guernsey	9101	10-9-39	7-9-43	273	5	5,265	5·08	267·98	Muresk Agricultural College	Muresk Homestead (2075)
Narrogin Daisy	A.I.S.	....	20-11-39	22-7-43	240	12·5	6,315	4·15	262·23	Narrogin School of Agriculture	Wooroloo Stirling 3rd
Camden Beauty	Jersey	...	9-9-39	16-6-43	120	30	4,020	6·18	248·79	C. E. Kruger....	Greenmount Golden Sultan (14688)
Glanavon Pink Pearl 3rd	A.I.S.	30601	9-11-38	23-10-42	240	10	5,940	3·99	236·25	D. Bevan & Sons	Parkview Commodore (306)
Westby Dahlia 2nd	do.	....	26-8-39	11-3-43	180	14	4,020	3·70	149·07	Burkitt & Brown	Westby Searchlight
Maxwell Miss Reformer	Guernsey	10859	1-7-40	4-3-44	60	13	789	6·03	47·64	P. Berridge	Moongi Oliver (1495)
COWS 4 YEARS AND UNDER 4½ YEARS—STANDARD 310 LB. BUTTER FAT.											
Grass Vale Buttercup 5th ..	Jersey	81261	22-6-39	2-8-43	273	13	7,269	6·40	465·77	R. H. Rose	Grass Vale Gold Boy (14684)
Juadine Peerless Lily 15th	do.	81989	20-5-39	5-10-43	273	21	9,318	4·90	457·02	Mrs. A. G. Eckersley	Austral Park Wonderful Standard (12423)
Koojan Ideal's Bluebell	Guernsey	8807	15-1-39	16-7-43	273	13	7,239	5·77	418·13	A. W. Padbury	Glenburnie Ideal (Imp.) U.S.A. (2548)
Denmark Pink Rose	do.	6969	24-7-38	25-11-42	273	15	7,425	5·49	407·96	Denmark Research Station	Denmark Auric (3313)
Glanavon Cowslip 5th	A.I.S.	....	27-10-38	4-10-42	273	23	10,209	3·96	405·12	D. Bevan & Sons	Parkview Commodore (306)
Travalgan Starbright 8th	Jersey	79296	6-7-39	30-7-43	273	15	6,990	5·70	398·71	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Wooroloo Rosebud 3rd	A.I.S.	....	29-5-39	25-7-43	240	9	9,030	4·24	383·25	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Grass Vale Lady Fowler 29th	Jersey	81632	9-9-39	5-10-43	273	16	7,410	5·10	377·97	R. H. Rose	Grass Vale Gold Boy (14684)
Travalgan Starbright 7th ..	do.	79295	25-5-39	17-8-43	273	14	6,852	5·49	376·44	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Glanavon Doris 8th	A.I.S.	30586	4-12-38	22-4-43	273	12	9,141	3·89	356·44	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Travalgan Lady Mint 8th ..	Jersey	79294	3-5-39	2-8-43	180	26	5,805	5·64	327·42	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Glanavon Sylvia 2nd ..	A.I.S.	30604	23-4-38	17-10-42	273	16	7,803	4·04	315·51	D. Bevan & Sons	Parkview Commodore (306)
Glanavon Thelma 3rd ...	do.	....	25-1-39	12-3-43	273	7	7,791	4·00	311·66	D. Bevan & Sons	Parkview Commodore (306)
Wooroloo Wendy 3rd ...	do.	....	27-9-38	19-11-42	273	5	6,945	4·34	301·85	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Pleasant Hill Eleanor	Guernsey	9246	31-8-38	17-1-43	273	18	5,934	5·06	300·78	P. G. Hampshire & Son	Yarraview Magnet (3867)
Wooroloo Bess	A.I.S.	23231	16-5-39	23-4-43	240	7	6,720	4·19	281·94	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Muresk Delia	Guernsey	9105	11-5-39	30-4-43	273	15	6,015	4·68	281·83	Muresk Agricultural College	Denmark Damon (2519)
Red Rose	do.	11313	1-9-38	23-12-42	273	7	4,431	5·94	263·39	P. Berridge	Willie (6483)

Muresk Treasure	do.	9118	12–7–39	30–9–43	273	8	4,764	5·32	253·46	Muresk Agricultural College	Muresk Homestead (2075)
Crantock Starbright's Princess	Jersey	80889	26–7–39	24–8–43	180	12	4,080	5·73	234·06	Mrs. G. H. Burnside	Crantock Starbright's Airman (15481)
Glanavon Pansy 5th	A.I.S.	....	13–6–39	18–8–43	120	32	5,760	3·63	209·28	D. Bevan & Sons	Glanavon Franklin (4829)
Muresk Rose Blossom	Guernsey	9113	3–1–39	3–4–43	90	12	1,200	5·26	63·21	Muresk Agricultural College	Koojan Ace's Goldseeker (3431)
Denmark Velveteen	do.	8541	2½–7–39	14–1–44	30	33	990	3·76	37·26	Denmark Research Station	Koojan Ace's Goldseeker (3431)

COWS 4½ YEARS AND UNDER 5 YEARS—STANDARD 330 LB. BUTTER FAT.

Juadine Peerless Lily 13th	Jersey	76977	20–12–38	25–8–43	273	29	11,382	6·45	734·47	Miss L. G. Hancock	Austral Park Wonderful Standard (12423)
Juadine March Flower	do.	81988	5–3–39	5–10–43	273	32·5	11,017	5·00	551·34	Miss L. G. Hancock	Austral Park Wonderful Standard (12423)
Crantock Primula's Tulip	do.	70900	15–3–38	5–11–42	273	19	8,127	6·56	533·17	Mrs. G. H. Burnside	Congelin Eminent's Golden (13623)
Grass Vale Twylish Lady	do.	76604	14–10–38	12–9–43	273	24	7,752	5·55	430·71	R. H. Rose	Grass Vale Gold Boy (14684)
Denmark Dame	Guernsey	6960	17–6–38	20–2–43	273	26	8,418	4·70	396·28	Denmark Research Station	Koojan Golden Prosper (2283)
Denmark Mary Rose	do.	6966	7–7–38	26–4–43	273	17·5	6,697	5·77	386·95	Denmark Research Station	Denmark Auric (3313)
Travalgan Starbright 6th	Jersey	74242	31–5–38	1–6–43	273	17	7,296	5·27	384·63	W. H. & T. F. Robinson	Glen Iris Golden Oxford (12694)
Wooroloo Doreen 2nd	A.I.S.	28637	8–4–38	9–1–43	273	24	8,922	4·11	366·81	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Wooroloo Dawn	do.	28636	4–10–38	29–6–43	210	20	8,430	4·31	364·17	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Glanavon Dahlia 9th	do.	30582	19 1–39	30–8–43	273	17	8,871	4·01	355·83	D. Bevan & Sons	Glanavon Gold Boy (4830)
Koojan Ideal's Dulcie	Guernsey	8810	25–10–38	17–7–43	273	12	5,976	5·89	352·32	A. W. Padbury	Glenburnie Ideal (imp. U.S.A.) (2548)
Tipperary Beauty 6th	A.I.S.	28217	8–8–38	6–3–43	273	20	7,830	4·39	343·76	W. G. Burges	Newstead Tourist (3419)
Wooroloo Heather 2nd	do.	28644	6–11–38	10–7–43	273	8	7,464	4·32	322·67	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Denmark Velvet	Guernsey	8540	23–8–38	6–6–43	273	17	6,951	4·41	307·03	Denmark Research Station	Denmark Auric (3313)
Radyr Park Coronation Belle	Jersey	73600	5–7–38	12–6–43	273	9	6,137	5·00	306·87	L. M. Temple ..	Navua Coronation Star (14929)
Wooroloo Glory	A.I.S.	28643	19–6–38	31–12–42	273	17	7,101	4·19	298·15	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Wooroloo Faith	do.	33989	10–1–39	9–8–43	240	6	6,930	4·24	293·94	Wooroloo Sanatorium Farm	Glanavon Genius (3957)
Kapara Sparkle 2nd	Jersey	77063	12–9–38	28–8–43	273	8·5	5,770	4·99	288·07	D. Bradford	Congelin Mandarin (14542)
Narrogin Maisie	A.I.S.	32146	1–11–38	15–6–43	273	6·5	7,420	3·85	286·52	Narrogin School of Agriculture	Wooroloo Sterling 3rd (3626)
Glanavon Doris 7th	do.	30585	2–12–38	24–6–43	150	35	7,140	3·90	278·88	D. Bevan & Sons ...	Glanavon Franklin (4829)
Brookfields Queen 4th	Guernsey	6841	22–3–38	30–11–42	273	13	5,139	4·83	248·70	P. G. Hampshire & Son	Brookfields Baron (3036)
Glanavon Gem 3rd	A.I.S.	30589	5–4–38	29–1–43	210	16	6,180	3·98	246·36	Burkitt & Brown .	Blacklands Jean's Supreme (1871)
Glanavon Nancy 2nd	do.	30598	2–12–38	10–7–43	240	14	6,000	3·97	238·50	D. Bevan & Sons ..	Glanavon Franklyn (4829)
Glanavon Pink Pearl 3rd	do.	30601	9–11–38	7–10–43	180	13	5,790	3·97	229·89	D. Bevan & Sons	Parkview Commodore (306)
Wooroloo Hope 2nd	do.	28645	2–9–38	9–5–43	120	11	2,760	4·19	115·89	Wooroloo Sanatorium Farm	Triumph of Pine Creek (2515)
Glanavon Cowslip 5th	do.	....	27–10–38	16–10–43	60	44	3,060	3·73	114·18	D. Bevan & Sons	Parkview Commodore (306)

HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk Last Day of Test.	Weight of Milk. for Period.	Average Test.	Weight of Butter Fat for Period.	Owner.	Sire.
						lb.	lb.	%	lb.		
COWS 5 YEARS AND OVER—STANDARD 350 LB. BUTTER FAT.											
Glanavon Doris 5th	A.I.S.	25170	5-12-36	26-10-42	273	34	14,457	4·13	597·88	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Denmark Orangebud	Guernsey	4123	9-8-32	17-11-42	273	26	11,328	4·74	537·73	Denmark Research Station	Koojan Golden Prosper (2283)
Wooroloo Heatner	A.I.S.	23247	5-11-37	25 9 43	273	24	11,772	4·28	503·96	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Denmark Petal	Guernsey	6968	4-10 37	27-6-43	273	17	9,021	5·56	502·45	Denmark Research Station	Koojan Golden Prosper (2283)
Grass Vale Golden Eve	Jersey	76601	23-6-38	24-9-43	273	30	8,700	5·63	489·92	R. H. Rose	Grass Vale Gold Boy (14684)
Denmark Dawn 2nd	Guernsey	5439	21-3-35	12-9-43	273	17	8,721	5·55	484·26	Denmark Research Station	Koojan Golden Prosper (2283)
Coogely Jonquil	do.	6945	1-11-37	8-4-43	273	22	6,876	6·96	479·16	Denmark Research Station	Coogely Judy's Goldmine (2621)
Denmark Rosemary	do.	5451	7-6-36	23-10-43	273	14	7,632	6·25	477·61	Denmark Research Station	Koojan Golden Prosper (2283)
Denmark Golden Dawn	do.	4118	9-1-43	28 6-43	273	20	8,190	5·79	474·57	Denmark Research Station	Koojan Golden Prosper (2283)
Radyr Park Dorothy 4th	Jersey	63850	5-10-35	8-6-43	273	18	9,299	5·06	471·20	L. M. Temple	Greenmount Graceful Lad (7292)
Wooroloo Dainty 2nd	A.I.S.	28634	17-2-38	1-5-43	273	26	11,418	4·06	463·61	Wooroloo Sanatorium Farm	Parkview Guardian (2557)
Crantock Silk Socks	Jersey	70901	6-6-37	2-5-43	273	13	7,719	5·93	457·78	Mrs. G. H. Burnside	Congelin Eminent's Golden (13623)
Crantock Cream Lass	do.	43542	7-6-31	2-4-43	273	13	7,719	5·70	440·30	Mrs. G. H. Burnside	Crantock Starbright's Montrose (5945)
Glanavon Rosina	A.I.S.	30603	3-5-37	16-4-43	273	14	9,447	4·56	431·60	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Denmark Bonnie Mary	Guernsey	6958	30-9-37	3-12-42	273	17	7,896	5·40	426·74	Denmark Research Station	Denmark Illustrious (3320)
Glanavon Lulu	A.I.S.	25183	25-10-36	9-9-43	273	5	9,780	4·17	407·86	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Camden Lady Bracken 2nd	Jersey	75578	13-10-37	25-11-42	240	27	7,410	5·43	403·08	C. E. Kruger	Greenmount Golden Sultan (14688)
Wooroloo Betty 5th	A.I.S.	23232	8-1-37	28-9-43	273	19	9,357	4·23	396·71	Wooroloo Sanatorium Farm	Triumph of Pine Creek (2515)
Denmark Golden Glory	Guernsey	6965	13-5-38	25-8 43	273	12·5	7,732	5·12	396·42	Denmark Research Station	Denmark Damon (2519)
Radyr Park Dorothy 5th	Jersey	68752	18-7-36	24-6-43	273	11	6,783	5·90	390·80	L. M. Temple	Greenmount Graceful Lad (7292)
Wooroloo Doll	A.I.S.	23237	22-4-35	24-5-43	273	23	8,859	4·36	386·84	Wooroloo Sanatorium Farm	Triumph of Pine Creek (2515)
Glanavon Tiny	do.	20212	25-9 34	18-7-43	210	27	9,690	3·97	385·50	D. Bevan & Sons	Blacklands Jean's Supreme (1871)
Camden Venus	Jersey	65846	16-12 36	25-11-42	273	17	6,246	6·12	382·32	C. E. Kruger	Greenmount Bonetienne's Tornado (11662)
Glanavon Melba	A.I.S.	25185	21 12-36	3-6-43	273	9	9,897	3·86	382·06	D. Bevan & Sons	Parkview Commodore (306)
Radyr Park Estrellita 2nd	Jersey	68753	26-8-36	6-8-43	273	11	6,648	5·88	381·50	L. M. Temple	Radyr Park Lady's Starlight (13128)
Glanavon Dell 4th	A.I.S.	30583	23-3-38	17-7-43	273	5	9,465	3·83	362·87	D. Bevan & Sons	Glanavon Elliott (3955)
Grass Vale Golden Cream 14th	Jersey	66782	1-9-36	8-8 43	210	16	6,240	5·80	362·07	R. H. Rose	Selsey Gay Boy (15134)

Tipperary Dove 5th	A.I.S.	22902	20 8 36	12 4-43	273	26	8,823	4·09	361·28	W. G. Burges	Blacklands Monarch's Commander (1877)
Radyr Park Dorothy 7th ...	Jersey	73601	22-6 37	29-6-43	273	11	6,198	5 78	358 63	L. M. Temple	Radyr Park Estrellita's Duplex (15050)
Koojan Ace's Dulcie	Guernsey	5658	6-3-36	7-2-43	273	21	6,333	5·62	356·20	Denmark Research Station	Homestead Ace (Imp. U.S.A.) (1631)
Wooroloo Sunbeam	A.I.S.	23273	24-10-36	28-4-43	273	15	8,055	4·41	355·30	Wooroloo Sanatorium Farm	Wooroloo Triumph 4th (3627)
Denmark Golden Day	Guernsey	5440	29-7 35	24-2 43	273	21	6,393	5·53	353·68	Denmark Research Station	
Denmark Diana	do.	6963	28-6-36	26-11 42	273	11	6,303	5·60	353·12	Denmark Research Station	Denmark Damon (2519)
Denmark Velda	do.	6973	13-7-36	10-12-42	273	6	7,668	4·59	352 12	Denmark Research Station	Denmark Damon (2519)
Yanget Pretty Maid 3rd	A.I.S.	34034	8-7-38	12-10-43	240	14	7,770	4·48	348·27	W. G. Burges	Sunrise of Parkview (I.M.S.) (1875)
Norinya Noreen	Jersey	73200	6-11-37	13-9-43	273	16	7,908	4·39	347·03	Mrs. A. G. Eckersley	Juadine Prince (14760)
Glanavon Charmer ..	A.I.S.	25160	24-4-37	3-1 43	273	21	8,283	4·19	347·51	D. Bevan & Sons	Parkview Commodore (306)
Denmark Orange Pekoe	Guernsey	5444	11-6-36	17-6-43	273	24	7,752	4·40	341·74	Denmark Research Station	Denmark Damon (2519)
Camden Lady Bracken	Jersey	60973	16-2-36	6-1-43	240	27	5,940	5 73	340 83	C. E. Kruger	Greenmount Bonetienne's Tornado (11662)
Denmark Wild Rose	Guernsey	6974	1-7-36	26-11-42	273	11	6,723	4 96	333·67	Denmark Research Station	Koojan Golden Prosper (2283)
Wattle Creek Reddy	A.I.S.	28495	18-10-37	13-7-43	273	12	8,691	3·79	330 13	E. T. Thatcher	
Melbourne Lisette	Guernsey	7443	15-12-36	25-11-42	273	11·5	6,214	5·25	326·83	P. G. Hampshire & Son	Yanget Autumn Sun (3630)
Brookfields Morden Lady	do.	5330	10-10-34	30-5 43	273	15	6,165	5·28	326 01	P. G. Hampshire & Son	Woodlands Fleur-de-Lys (2547)
Juadine Peerless Lily 6th	Jersey	57869	27-8-34	20-5-43	273	17·5	7,177	4·51	324·17	D. Bradford	Koojan Lord Barclay (1031)
Wattle Creek May	A.I.S.	28490	18-3-37	8-5-43	273	16	7,968	4·04	322·40	E. T. Thatcher	Juadine Sunshine (8212)
Glanavon Nancy	do.	25187	5-10-36	15-6 43	273	10	7,950	4·00	318·10	D. Bevan & Sons	Yanget Autumn Sun (3630)
Brookfields Lady Faith	Guernsey	4062	19-6-32	25-8-43	273	7·5	6,772	4·57	309·66	P. G. Hampshire & Son	Glanavon Ponsford (3202)
Wattle Creek Bell ...	A.I.S.	28484	27-8-37	26-9-43	273	21	7,833	3·90	306·14	E. T. Thatcher	Koojan Lord Barclay (1031)
Glanavon Gold 4th ..	do.	30592	19-10-37	4-7-43	240	6	7,380	4·13	305·52	D. Bevan & Sons	Yanget Autumn Sun (3630)
Denmark Dawn Childe	Guernsey	6962	14-5-37	17-10-42	273	16	5,688	5·35	304·82	Denmark Research Station	Glanavon Neptune (3959)
Wattle Creek Pansy	A.I.S.	28492	8-1-38	18-5-43	273	15	7,305	4·17	304·65	E. T. Thatcher	Woolongbar Reformer (538)
Brookfields Morden Lady 3rd	Guernsey	6839	27-9-37	11 9-43	273	8·5	6,595	4·50	297·12	P. G. Hampshire & Son	Yanget Autumn Sun (3630)
Radyr Park June	Jersey	73603	12-6-38	26-6-43	273	10·5	6,061	4·89	296·86	L. M. Temple	Koojan Ace's Majestic (2735)
Brookfields Lady Lisle	Guernsey	5326	27-7-35	8-11-42	273	11	5 748	5·08	292 39	P. G. Hampshire & Son	Navua Coronation Star (14929)
Coogley Mildred Belle	do.	3893	3-4-32	21-2-43	273	23	7,284	3·99	291·21	P. G. Hampshire & Son	Koojan Ace's Majestic (2735)
Koojan Golden Ripple	do.	7248	26-3-38	2-5 43	273	14	5,532	5·26	291·04	Denmark Research Station	Denmark Radiant Chief (1273)
Tipperary Dove 10th	A.I.S.	28220	25-3-38	15-6-43	273	15	6,945	4·12	286 61	W. G. Burges	Homestead Ace (Imp. U.S.A.) (1631)
Norric Peggy	do.	26939	14-4-35	19-6-43	210	21	7,290	3·90	284·82	W. G. Burges	Blacklands Monarch's Commander (1877)
Crantock Napoleon's Daffodil	Jersey	75813	22-10-37	6-9-43	180	16	4,860	5·73	278·70	Mrs. G. H. Burnside	Warwick Rufus (3595)
Crantock Golden Bell ...	do.	70896	13-8-37	20-5-43	180	20	4,680	5·62	263·07	Mrs. G. H. Burnside ..	Crantock Blonde's Napoleon (8207)
Crantock Primula's Tulip	do.	70900	15-3-38	12-10-43	150	16	4,470	5·65	252·93	Mrs. G. H. Burnside ..	Congelin Eminent's Golden (13623)
Glanavon Dahlia 7th	A.I.S.	30581	23-3-38	11-8-43	120	36	6,495	3·83	249·09	D. Bevan & Sons	Congelin Eminent's Golden (13623)
Brookfields Honour	Guernsey	6836	8-9-37	10-6-43	180	16	4,440	5·50	244·20	P. G. Hampshire & Son	Glanavon Neptune (3959)
Glanavon Fairy 3rd ...	A.I.S.	30588	21-4-38	8-5-43	210	16	5,670	4·25	241·35	D. Bevan & Sons	Koojan Ace's Majestic (2735)
Denmark Angeline	Guernsey	6956	4-7-37	27-2-43	273	14	4,242	5·63	238·91	Denmark Research Station	Blacklands Jean's Supreme (1871)
Wooroloo Poppy 4th	A.I.S.	28654	12-4-38	8 8-43	210	7	5,670	4·13	234·66	Wooroloo Sanatorium Farm	Koojan Golden Prosper (2283) Parkview Guardian (2557)

HERD TESTING—*continued.*

Name of Cow.	Breed.	Herd Book No.	Date of Birth.	Date of Entry to Test.	No. of Days in Test.	Weight of Milk on Last Day of Test.	Weight of Milk for Period.	Average Test.	Weight of Butter Fat for Period.	Owner.	Sire.
COWS 5 YEARS AND OVER—STANDARD 350 LB. BUTTER FAT—*continued.*											
Wattle Creek Rosie	A.I.S.	28498	1-8-37	26-9-43	150	24	5,910	3·89	229·92	E. T. Thatcher .	Yanget Autumn Sun (3630)
Amy	Guernsey	9825	25-9-38	20-10-43	210	9	3,855	5·91	228·12	P. Berridge . .	Willie (6488)
Red Rose	do.	11313	1-9-38	10-12-43	180	6	3,630	6·03	219·09	P. Berridge	Willie (6488)
Glanavon Daphne 3rd	A.I.S.	25165	13-2-37	7-10-43	150	21	5,550	3·71	206·28	Burkitt & Brown ..	Parkview Commodore (306)
Glanavon Pansy 4th	do.	30599	10-11-37	25-10-43	150	16	5,250	3·84	201·78	Burkitt & Brown ..	Blacklands Jean's Supreme (1871)
Westby Pearl	do.	15140	19-2-33	7-9-43	180	10	5,490	3·31	181·74	Burkitt & Brown	Telyarup Duke (956)
Muresk Tess	Guernsey	6066	15-5-35	9-2-43	150	12	2,790	5·10	142·38	P. G. Hampshire & Son	Muresk Homestead (2075)
Camden Venus	Jersey	65846	16-12-36	3-10-43	30	30	900	4·65	41·85	C. E. Kruger ..	Greenmount Bonetienne's Tornado (11662)
Glanavon Gem	A.I.S.	25178	18-11-35	11-1-44	30	32	960	4·15	39·90	Burkitt & Brown	Glanavon Nimrod (437)

Colchicine.

A. J. Millington, Plant Geneticist.

It has been possible by plant selection and controlled breeding to develop highly specialised varieties of most crop plants for widely differing climates. The principal old world crops such as the cereals have been adapted to the new farmlands of the Americas and Australia. Parallel with the breeding for particular environments, a programme to develop disease resistant varieties has been conducted.

The standard procedure among plant breeders is to collect as many variants of the crop as possible and to study them under a particular set of climatic and disease conditions. In this manner the desirable characteristics are assembled in a number of varieties and by a judicious breeding programme subsequently incorporated as a variety well suited to the local habitat. The point of origin of a species is usually regarded as the locality in which the largest number of types occur. Consequently, the Russian plant breeders in developing frost-resistant strains of potatoes collected as many types of primitive potatoes as possible from the Andes where the species is believed to have originated.

Inter-species Hybrids.

A major difficulty which the plant breeder usually encounters is the lack of fertility between different species. The field for selection is limited to crosses within the groups which produce fertile progeny. In the animal world, the common inter-species cross between the horse and the donkey is easily effected but the fertility of the resultant mule is practically nil.

Lack of ability to produce progeny by means of sexual reproduction, i.e., fertility, can be due to many causes, but in the case of inter-species crosses it is usually occasioned by the chromosomes being so unlike that they will not pair during the formation of the reproductive cells.

The Restoration of Fertility.

By doubling the chromosome number, each chromosome is provided with a partner and increased fertility usually results.

Doubling of the chromosome number is known to have occurred in nature with most plant species. In wheat, there is a series of species with seven, fourteen and twenty chromosomes in the sexual cells.

The increase in chromosome numbers is usually accompanied by an increase in plant size, vigour and variability. All of these are of economic importance.

Colchicine.

Plant breeders desirous of increasing the fertility of inter-species hybrids have a valuable aid in the drug colchicine. The action of this alkaloid on the plant cell is to inhibit the laying down of the cell wall after the chromosomes have divided. This results in cells with two or more sets of chromosomes.

The treated plants are usually stunted and distorted but the progeny will retain the vigour of the hybrid species.

Geneticists usually differentiate between plants which derive their double chromosome complement from different species and those which obtain them from the same species. The fertility of the latter is usually adversely affected by chromosome doubling. Their greater vegetative vigour can, however, be readily utilised in crops such as potatoes which are not reproduced by true seed.

Colchicine is not a "growth elixir" but it may be useful to the plant breeder in developing new species and varieties of cultivated plants.

Stock Foods.

The following Stock Foods have been registered at the Department of Agriculture under the Stock Foods Act, 1924–1942, for the year commencing 1st July, 1944.

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.							Wholesale Price per ton on rails, Perth.
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (CaO).	Other.	
					% (Min.)	% (Min.)	% (Max.)	%	%	%	%	£ s. d.
A.—SIMPLE FOODS.												
1.—*Meat Meals.*												
Meat Meal	2	ANCHO	Anchorage Butchers, Ltd.	Waste meat products	50·56	14·59	1·48	0·56	9·39	11·24		12 5 6
Do.	8	PANNIFEX	Burridge & Warren, Ltd.	....	40·00	8·00	3·00	....	....	....	....	15 10 0
Do.	18	J.K.S. No. 1	J. Kitchen & Sons Pty., Ltd.	Animal fat and bone	44·00	6·00	1·00	....	14·00	....	....	13 10 0
Do.	38	BYRON	W. R. & N. N. Clarke	....	60·00	9·00	....	....	....	....	....	14 15 0
Blood Meal	7	PANNIFEX	Burridge & Warren, Ltd.	....	75·50	2·00	5·00	....	....	....	....	21 0 0
Meat and Bone Meal	36	S.M.P.	W. R. & N. N. Clarke	Meat and bone meal	60·00	7·00	*Nil*	(	27·00	)	....	13 10 11
Do. do.	37	ABERDEEN	do. do.	do. do. do.	53·00	9·00	2·00	(	18·00	)	....	13 10 11
Do. do.	57	METE-O-VITE	Goldsbrough, Mort & Co., Ltd.	do. do. do.	42·00	8·15	0·15	....	....	....	....	17 15 0 *
Bovina	98	IMPERIAL	W. Angliss & Co. (Aust.) Pty., Ltd.	Animal offal	17·00	10·00	1·00	30—33% Mineral (as ash)				10 0 0 *†
Meat Meal	99	do.	do. do. do.	do.	60·00	10·00	1·00	12—14% do. do.				9 0 0 *†
Do.	....	EXCELSIOR	Barrow, Linton & Co.	do.	45·00	10·00	1·50	....	....	....	....	12 8 4 *
2. *Bone Meals.*												
Bone Meal	3	ANCHO	Anchorage Butchers, Ltd.	Waste meat products	23·63	2·44	Trace	Trace	26·76	26·95		13 5 6
Do.	6	WAME	West Australian Meat Exports	Bones solely	18·75	....	....	0·25	26·00	27·00	....	11 10 0 †
Bone Flour	4	TRICALOS	Davis Gelatine (Aust.) Pty., Ltd.	Sterilised bone flour	5·00				32·50	40·00		11 15 0 *
3. *Others.*												
Linseed Meal	39	MEGGITS	Elder, Smith & Co., Ltd.	Pure linseed from which a proportion of the oil content has been extracted by hydraulic pressure only	30·00	6·00	10·00	....	....	....	....	13 7 6
Linseed Nuts	40	do.	do. do. do.	do. do. do.	30·00	6·00	10·00	....	....	....	....	13 7 6
Dried Butter Milk	5	SUNNYWEST	South-West Co-op. Dairy Farmers, Ltd.	....	36·20	6·40	....	(—Total Ash 8·40%—)			Milk Sugar 35·4 Lactic Acid 6·00	24 0 0 †
Milk Sugar Food	34	KRAFCO	L. M. Cullen & Co., Ltd.	Whey, from cheese manufacture	10·00	·50	*Nil*		1·00	·70	Lactose 68·00 Riboflavin 25 μ/gm.	25 10 0
Do. do.	35	KRAFTONE	do. do. do.	do. do. do.	10·60	·50	*Nil*	....	1·00	·70	Lactose 68·00 Riboflavin 25 μ/gm.	28 0 0
Peanut Meal	79	ETA	Cruickshank Bros.	Peanut kernels	49·00	2·00	6·00	....	....	....	....	10 7 0

B.—Compound Foods.													
1. *Cattle Foods.*													
Cattle Food	16	EVE-LYN ..	Tropical Traders, Ltd.	Linseed meal, linseed whole, pollard, salt, limestone, chalk, animal charcoal, molasses, sulphur, sulphate of iron, copper sulphate, medicinal herbs	7·62	5·47	14·04	5·06	7·21	9·52	Sulphur. 2·66	Other Salts etc. 3·80	21 5 0*
Cow Meal	53	WESTERN	David Gray & Co., Ltd.	Malt combings, linseed-cocoanut meals, pollard, oatmeal, lime, salt	18·00	2·50	10·00				.	.	7 18 9
Dairy Meal	23	WESFARMERS	The Westralian Farmers, Ltd.	Wheatmeal, bran, cocoanut meal, peanut meal, linseed meal, bonemeal, calcium carbonate, salt, copper sulphate	18·00	4·00	8·00	..	...	.		...	11 0 0
Milk Food	52	WESTERN	David Gray & Co., Ltd.	Linseed, peanut-cocoanut meal, oaten pollard, salt, potassium iodide, etc., bone flour, pollard	30·00	3·00	10·00	..	...	...		....	13 0 0
More Cream	91	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Whole linseed, wheat, pollard, cocoanut meal, minerals, etc.	13·00	7·00	6·50	..	....	....	..	....	14 10 0
More Milk	92	do.	do. do. do.	Cocoanut meal, linseed meal, pollard, minerals, etc.	19·00	4·50	6·50	...	.	....		...	14 10 0
Sweet Cow Food	94	do.	do. do. do.	Linseed chaff, bran, wheatmeal, molasses, minerals, etc.	18·00	2·50	9·50	.	..	....	..	...	8 10 0
Sweet Dairy Food	95	do.	do. do. do.	Wheatgerm, wheatmeal, oatmeal, bran, cocoanut meal, molasses, minerals, etc.	13·00	2·00	7·00	.	.	..	..	..	9 15 0
Stock Food	41	VETAMAC ..	A. H. McDonald & Co.	Salt, sulphate of iron, bonemeal, molasses, iodine, magnesium sulphate, soda carbonate, aniseed, pollard, maize meal, linseed meal	17·76	5·76	7·23	....	..	...	Sulph. of Iron. 5·00 Mag. Sulph 0·90	Soda Carb. 2·20 Iodine. 0·05	26 15 0
Calf Food	1	STAR	Robert Harper & Co., Ltd.	Oats, linseed, maize, barley and rice meals, and condiments	12·50	12·50	6·00	.	.	..			18 0 0†
Do.	14	EVE-LYN	Tropical Traders, Ltd.	Wheat, pollard, whole linseed, salt, sugar, chalk, sulphur, tumeric, soda bicarbonate, copper sulphate, and medicinal herbs	10·75	4·77	3·86	2·89			Total Ash. 5·98	Other Salts and Medicinal Herbs. 3·38	22 0 0*
Calf Meal ...	22	WESFARMERS	The Westralian Farmers, Ltd.	Linseed meal, oat meal, wheat meal, maize meal, butter milk, meat meal, bone meal, liver meal, calcium carbonate, salt, copper sulphate	18·00	5·00	8·00	..	..		.		13 0 0

STOCK FOODS—*continued.*

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.								Wholesale Price per ton on rails, Perth.
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (CaO).	Other.		
					%	%	%	%	%	%	%	%	£ s. d.
Calf Food	42	VETAMAC .	A. H. McDonald & Co.	Maize meal, linseed meal, whole meal, powdered milk, mutton bird oil	20·23	13·13	5·75				Mutton Bird Oil. 10·00		37 10 0
Do. ...	51	WESTERN ..	David Gray & Co., Ltd.	Linseed, oat, peanut, and coconut meals, butter milk powder, and minerals	20·00	4·00	9·00	. .			. .		14 10 0
Do.	77	PARSONS ...	Parsons & Co. Pty., Ltd.	Barley, oats, wheat, maize, rice, and linseed.	11·50	14·00	6·50	.					21 0 0
Do.	93	THOMAS .	W. Thomas & Co. (W.A.), Ltd.	Whole linseed, wheat, wheat germ, oat meal, pollard, minerals, etc.	15·50	9·00	7·00	. .	...	...	...		16 10 0
Do. ..	56	KAF-O-VITE	Goldsbrough, Mort & Co., Ltd.	Bone charcoal, calcium carbonate, cinnamon, sugar, oil of aniseed, contains 96% of meals from by-products of rice	14·50	13·00	9·00	.	0·85	1·80	.		26 0 0
2. *Sheep Foods.*												Other Salts and Medicinal Herbs.	
Sheep Food ...	17	EVE-LYN .	Tropical Traders, Ltd. .	Linseed meal, whole linseed, pollard, salt, limestone, chalk, animal charcoal, molasses, sulphur, sulphate of iron, copper sulphate, medicinal herbs	9·81	5·95	14·79	5·82	4·34	10·15	Sulphur. 2·63	4·04	21 5 0*
Sheep Breeder Cubes	19	WESFARMERS	The Westralian Farmers, Ltd.	Oats, wheat, coconut, peanut, linseed, salt, lime, molasses	18·00	7·50	7·50	Under 2	...	Under 1	...	.	15 10 0*
Maintenance Sheep Cubes	20	do.	do. do. do.	Oats, wheat, coconut, linseed, peanut, salt, lime, pea meal, molasses	14·00	4·50	6·50	Under 2	...	Under 1	..	....	12 0 0*
Maintenance Sheep Nuts	54	WESTERN .	David Gray & Co., Ltd.	Linseed, wheat, oat, coconut and barley meals, bonefiour, salt, molasses	16·00	3·00	7·00	...	...	...	....	....	12 0 0
Ewe and Lamb Nuts	55	do.	do. do. do.	Linseed, coconut, pea, barley, oat, and peanut meals, bonefiour, salt, molasses veast	20·00	3·00	7·00		.				15 0 0

3. *Pig Foods.*													
Pig Food	15	EVE-LYN ..	Tropical Traders, Ltd.	Pollard, linseed meal, whole linseed, salt, limestone, chalk, sulphur, animal charcoal, sulphate of iron, limonite, copper sulphate, medicinal herbs	10·25	10·51	12·35	2·12	4·44	9·60	Sulphur. 8·76	Medicinal Herbs and other Salts. 2·73	26 8 0*
Pig Protein Meal	21	WESFARMERS	The Westralian Farmers, Ltd.	Meat meal, bone meal, butter milk, cereals, oyster shell, common salt, copper sulphate	33·00	7·00	3·00	.					15 5 0
4. *Poultry Foods.*													
Laying Mash	24	WESFARMERS	The Westralian Farmers, Ltd.	Wheat meal, bran, oatmeal, butter milk, meat meal, bone meal, liver meal, oyster shell, salt	17·50	4·00	7·00	..					8 17 6
Poultry Laying Pellets	33	RED COMB ..	do. do. do.	Wheat, oats, meat meal, butter milk, lime, salt, bran	17·50	4·00	7·00	Under 1		Under 1			9 7 6*
Laying Mash A.	48	WESTERN ...	David Gray & Co., Ltd.	Pollard, bran, "Western" egg food, yeast	17·00	3·00	7·50	.		. .			9 2 6
Laying Mash B.	49	do.	do. do. do.	Pollard, bran, wheat meal, pea meal, coconut meal, bone meal, yeast	14·00	3·00	7·50	.		.		.	8 17 6
Laying Mash	58	MORLAY ..	Robert B. Young ..	Wheat meal, bran, pollard, meat meal, bone meal, salt, Epsom's salts, oyster shell flour, pea meal or linseed meal or coconut meal	15·00	3·00	6·00						10 10 0
Laying Allmash	59	do. ..	do. do. do.	Wheat meal, bran, pollard, meat meal, bone meal, salt, Epsom's salts, oyster shell flour, pea meal or linseed meal or coconut meal	14·50	2·00	6·00						9 15 0
Laying Mash No. 1	81	THOMAS ..	W. Thomas & Co. (W.A.), Ltd.	Pollard, bran, wheat meal, meat meal, coconut meal, minerals	16·00	4·30	6·50					.	9 12 6 J. 10 2 6 H.
Laying Mash No. 2	82	do. ..	do. do. do.	Pollard, bran, wheat meal, wheat germ, pea meal, coconut meal, minerals, etc.	15·50	4·50	7·00					....	9 12 6 J. 10 2 6 H.
Standard Laying Mash	83	do.	do. do. do.	Bran, pollard, meat meal, minerals	15·50	4·50	7·00					..	8 12 6 J.
Quick Lay	80	do.	do. do. do.	Meat meal, blood meal, coconut meal, minerals, etc.	37·00	7·00	4·00					..	9 2 6 H. 17 15 0
Egg Food	50	WESTERN	David Gray & Co., Ltd.	Meat, fish, blood meal, linseed-peanut meal, cocoa, calcium carbonate, sulphur, potassium iodide, etc., yeast	44·00	6·00	4·00						15 15 0

STOCK FOODS—*continued.*

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.								Wholesale Price per ton on rails Perth.
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (CaO).	Other.		
					%	%	%	%	%	%	%	%	£ s. d.
Pullet Food "A"	46	do.	do. do. do.	Meat-fish meal, butter milk powder, linseed, peanut-cocoanut meals, cod liver and fish oils, minerals	32·00	5·00	1·50	....	....	....	....	....	18 10 0
Pullet Food "B"	47	do.	do. do. do.	Butter milk powder, meat-fish meal, linseed-peanut-cocoanut meals, cod liver and fish oils, tobacco dust, pollard, minerals	25·00	3·00	4·00	....	....	....	....	....	18 10 0
Grower's Mash	25	WESFARMERS	The Westralian Farmers, Ltd.	Bone meal, meat meal, bran, oatmeal, butter milk, wheat meal, oyster shell, salt, wheat germ	14·00	4·00	5·00	....	....	....	....	....	10 7 6
Grower's Pellets ...	32	RED COMB ...	do. do. do.	Wheat meal, bran, oatmeal, butter milk powder, bone meal, salt, lime sand, wheat germ	14·00	4·00	7·00	....	....	....	....	....	10 17 6*
Growing Mash	60	MORLAY	Robert B. Young	Wheat meal, bran, pollard, meat meal, bone meal, salt, Epsom salts, linseed meal	14·00	2·00	6·00	....	....	....	....	....	10 2 6
Growing Allmash	61	do.	do. do. do.	do. do. do.	13·50	2·00	6·00	..	..	..	..	..	9 10 0
Protein Meal "A"	28	WESFARMERS	The Westralian Farmers, Ltd.	Salt, bone meal, meat meal, dried butter milk, liver meal, maize meal, oyster shell	42·00	9·00	2·00	...	...	...	..	..	17 2 6
Protein Meal "B"	29	do.	do. do. do.	Meat meal, liver meal, oyster shell, common salt, bone meal	45·00	9·00	3·00	....	....	....	....	..	15 5 0
Breeders' Mash ...	84	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Wheat germ, wheat meal, pollard, bran, cocoanut meal, minerals, etc.	16·00	4·50	6·50	....	....	....	....	..	11 0 0
Chick Mash "A"	26	WESFARMERS	The Westralian Farmers, Ltd.	Bone meal, oyster shell, common salt, bran, wheat meal, oat meal, maize meal, butter milk, liver meal, meat meal, wheat germ	17·00	4·00	5·00				Codliver Oil. 2·00	Mang. Sulphate. Trace	12 10 0

Chick Mash "B"	27	do.	do. do. do.	Wheat meal, bran, maize meal, butter milk, meat meal, bone meal, oyster shell, common salt, wheat germ	15·00	4·00	5·00	...	...	...	Codliver Oil. 1·00	...	11 10 0	
Chick Pellets "A"	30	RED COMB	do. do. do.	Butter milk powder, meat meal, bone meal, liver meal, maize meal, wheat meal, bran, pollard, codliver oil, salt, lime sand, manganese sulphate, wheat germ	18·00	4·00	5·00	...	...	...	...	....	12 17 6	*
Chick Pellets "B"	31	do. do.	do. do. do.	Butter milk, liver meal, bone meal, meat meal, maize meal, salt, wheat meal, bran, lime sand, wheat germ	16·00	4·00	5·00	....	....	....	....	..	12 0 0	*
Chick Starter	43	WESTERN	David Gray & Co., Ltd.	Pollard, bran, maize meal, cocoanut meal, butter milk, meat meal, wheat meal, yeast, boneflour, wheat germ, cod liver oil, manganese sulphate	17·00	3·00	4·50						13 5 0	
Chick Builder	44	do.	do. do. do.	Pollard, bran, butter milk, maize meal, meat, linseed, bone meal, codliver oil, minerals, yeast	15·00	2·50	6·50	....	....	....	....	..	11 10 0	
Chick Starter	62	MORLAY	Robert B. Young	Wheat meal, bran, meat meal, bone meal, shellgrit, butter milk, salt, codliver oil, maize meal	14·00	3·00	4·75	....	..	....	...	....	14 5 0	
Chick Mash	63	do.	do. do. do.	Wheat meal, bran, meat meal, bone meal, butter milk, charcoal, salt, shellgrit, maize meal (when available)	13·75	1·00	6·00	....	....	....	....	....	13 5 0	
Chick Allmash	64	do.	do. do. do.	do. do. do.	13·00	1·00	6·00						12 0 0	
Chicken Meal ...	65	PATRIOT	J. & W. Bateman, Ltd.	Wheat, panicum seed, peas, maize, shellgrit	11·80	3·00	3·80						19 0 0	
Chicken Mash	66	PATRIOT	J. & W. Bateman, Ltd.	Pollard, bran, maize meal, oatmeal, powdered milk, bonemeal, meat meal, chick food	15·80	4·20	4·30	....	....	....	....	....	28 0 0	
Chick Grower	85	THOMAS ...	W. Thomas & Co. (W.A.), Ltd.	Wheat germ, bran, pollard, milk powder, maize-pea meal, cocoanut meal, minerals, etc.	14·50	3·50	6·50	...	....	....	....	....	13 0 0	
Chick Starter	86	do.	do. do. do.	Wheat germ, bran, wheat meal, pollard, milk powder, meat meal, bone meal, maize-pea meal, cod liver oil, minerals	15·50	4·00	6·00	....	....	....	....	....	14 15 0	

STOCK FOODS—*continued.*

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.								Wholesale Price per ton on rails, Perth.
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (CaO).	Other.		
					%	%	%	%	%	%	%	%	£ s. d.
Chicken Milk No. 1	87	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Milk powder, meat meal, coconut meal, pollard, minerals, etc.	18·00	3·00	6·00	..	....	.	.	.	19 0 0
Chicken Milk No. 2	88	do. ..	do. do. do.	Milk powder, meat meal, pollard, pea meal, coconut meal, minerals, etc.	16·00	3·50	5·00	.	.	..	..	.	19 0 0
Quick Grow	89	do. .	do. do. do.	Meat meal, blood meal, coconut meal, minerals, etc.	37·00	7·00	4·00	..	..	...	.	.	17 15 0
Cockerel Fattening Mash	90	do. ..	do. do. do.	Wheat meal, pollard, oatmeal, bran, barley meal, molasses, minerals, etc.	10·50	3·00	7·00	....	...	..	..	..	10 0 0
Fattening Mash ..	45	WESTERN .	David Gray & Co., Ltd.	Pollard, bran, oatmeal, linseed meal, barley meal, meat meal, minerals	17·00	4·00	9·00	....	..	..	..		9 5 0
Poultry Food ...	101	EGGOLEEN .	Barrow, Linton & Co.	Meat meal, liver meal, bone meal, dicalcic phosphate, butter milk powder, salt, epsom salts, iron sulphate, copper sulphate, calcium carbonate	40·00	9·00	1·50	..	....	...	...	..	16 0 0*
Laying Mash ...	102	EGGLAYER ...	do. do. do.	Bran, pollard, wheat meal, oat pollard, meat meal, lime, salt	17·15	3·50	4·25	....	....	....	..	...	8 15 0*
Growing Mash	103	GROWELL	do. do. do.	Bran, pollard, wheat meal, oat pollard, maize, meat meal, limestone, salt, wheat germ, dried blood	16·90	3·95	4·56	....	....	....	....	..	10 0 0*
Starteen Mash	104	VITALIZER ...	do. do. do.	Bran, pollard, wheat meal, oat pollard, meat meal, milk powder, limestone, salt, dried blood, wheat germ, fish oil	16·95	4·00	4·50	....	...	.	..		12 10 0*
Chick Grain .	105	CHIC CHIC ..	do. do. do.	Wheat, oats, maize, blue peas	10·50	3·00	5·10		...				11 10 0*

5. *Horse Foods.*													
Horse Food	13	EVE-LYN	Tropical Traders Ltd	Pollard, linseed meal, whole linseed, wheat, salt, chalk, magnesium sulphate, sulphur, sulphate of iron, copper sulphate, sodium bicarbonate, medicinal herbs	12·87	5·64	7·14	5·00	1·01	1·54	Sulphur 1·84	Other Salts and Medicinal Herbs 5·33	46 8 0*
Horse Food ...	96	THOMAS ...	W. Thomas & Co. (W.A.), Ltd.	Whole linseed plus wheat, wheat germ, oatmeal, pollard, molasses, minerals, etc.	14·50	10·00	7·00	...	....	....	....	...	16 0 0
Horse Meal	97	do. ...	do. do. do.	Linseed chaff, wheaten chaff, bran, oatmeal, molasses, minerals	12·50	3·00	12·00	....	....	....	...	...	9 5 0
6. *Dog Foods.*													
Bone Shapes	67	SNAPS	A. E. Robinson ...	Wheat, bone, meat, vegetable	15·00	4·00	2·00	....	3·50	4·00	....	....	6d. per lb.
Do.	68	SYMONDS	do.	do. do. do.	15·00	4·00	2·00	....	3·50	4·00	....	....	6d. per lb.
Charcoal Shapes	69	SNAPS	do.	Wheat, bone, meat, vegetable, charcoal	14·00	3·00	6·00	....	2·50	2·50	....	....	6d. per lb.
Dog Biscuits	70	BOANS LOCAL	do.	Wheat, bone, meat, vegetable	15·00	4·00	3·00	....	2·50	2·50	....	....	32s. per 100lb.
Puppy Meal	71	SNAPS	do.	do. do. do.	15·00	4·00	2·00	....	3·50	4·00	....	....	6d. per lb.
Plain Shapes	72	do.	do.	do. do. do.	15·00	4·00	2·00	....	3·50	3·50	....	....	6d. per lb.
Hound Meal	73	do.	do.	do. do. do.	15·00	4·00	3·00	....	2·50	2·50	....	....	4d. per lb.
Puppy Biscuits	74	do.	do.	do. do. do.	15·00	4·00	2·00	....	3·50	4·00	....	....	6d. per lb.
No. 1 Dog Biscuits	75	do.	do.	do. do. do.	15·00	4·00	2·00	....	3·50	4·00	....	...	6d. per lb.
Dog Food	76	SNAPETTES	do.	do. do. do.	15·25	13·00	4·00	...	4·00	5·00	....	....	4d. per lb.
Do.	78	MEATIES	Animal Health Products Pty., Ltd.	Wheat meal, barley meal, coconut meal, linseed, peanut meal, rice polishings, meat or fish meal, boneflour	20·00	7·00	10·00	....	....	....	....	....	£ s d. 21 0 0*
C.—STOCK LICKS.													
Copper Lick	9	C.S.M.L.	Cuming, Smith & Mt. Lyell F.F., Ltd.	Dicalcic phosphate, copper sulphate, salt	....	...	....	66·00	12·50	....	Copper Sulphate. 0·10	....	11 13 10 B†
Denmark Lick Substitute	10	do.	do. do. do.	Limonite, sulphate of copper, salt	....	....	....	38·00	....	....	0·14	Limonite. 20·00	8 11 3 B† 9 12 11 Bu† 20 18 3 †
Dicalcic Phosphate	11	do.	do. do. do.	Calcium phosphate (at least 90% dicalcic)	....	....	....	....	37·00	28·00	...	....	21 18 3 Bu† 22 18 3 Ge†
Do. do.	12	do.	do. do. do.	Dicalcic phosphate lick, salt, molasses	....	....	....	38·00	18·00	13·00	Molasses. 5·00	....	14 16 6 B†

* Short ton. † Cost at Works. B, at Bassendean. Bu, at Bunbury. Ge, at Geraldton. J, in Jute bags. H, in Hessian bags.

Agricultural Broadcasts.

The following programme of Agricultural Talks has been arranged for the October-December quarter and will be broadcast from Station 6WA at 9.15 p.m. each Thursday.

Date.	Talk Prepared by :	Title.	Summary.
	I.—FARMERS IN A CHANGING WORLD.		
Oct. 19	G. W. R. Meadly, Assistant Government Botanist, Department of Agriculture	Chemicals as Weed Killers	The role of chemicals in this phase of agriculture will be discussed with particular reference to selected herbicides.
Nov. 16	C. F. H. Jenkins, Government Entomologist, Department of Agriculture	Insecticides and their Importance in Agriculture	A brief outline will be given of the development of insecticides for use in agriculture, together with notes on modern trends and special reference to D.D.T. The reason for the present rationing scheme and war conservation of material will be discussed.
Dec. 14	R. P. Roberts, Agricultural Adviser	Mechanisation in Agriculture	Progress in the application of mechanical power to farming operations will be reviewed and its implications for the future discussed.
	II.—TOPICAL ITEMS.		
Oct. 26 Nov. 23 Dec. 21	G. K. Baron Hay, Under Secretary for Agriculture, will discuss current events in Agriculture		
	III.—FARMERS' FORUM.		
Oct. 5 Nov. 2 Nov. 30 Dec. 28	Discussion on topics submitted by farmers is arranged by G. A. Currie, Professor of Agriculture, University of Western Australia		
	IV.—TECHNICAL TALKS.		
Oct. 12	C. F. H. Jenkins, Government Entomologist, Department of Agriculture	The Fruit Fly ...	The importance of this pest to the fruit industry will be discussed and control measures will be recommended.
Nov. 9	W. L. McGarry, Sheep and Wool Adviser	Merino Wool—Quality versus Quantity.	The importance of maintaining a high standard in sheep and wool production will be discussed.
Dec. 7	J. O'Donnell, Fire Control Officer, Forests Department	Bush Fire Prevention	Timely preventive measures for reducing fire hazard will be discussed.

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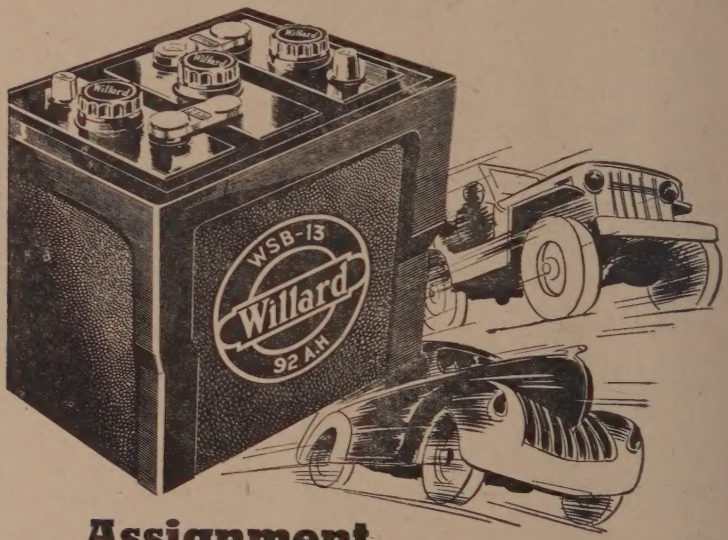

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